Children's Morphological Awareness: Can the Use of Apostrophes and Capital Letters be Improved Through Intervention?

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Statement of Sources

I declare that this report is my own original work and that contributions of others have been duly acknowledged.

Jessica Evans

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Acknowledgments

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Abstract

The aim of this study was to determine whether a half-hour intervention could improve children's use of apostrophes or capitals, and whether this use was related to morphological awareness. Participants were 55 children in Grades 3 to 4 (24 males; *M* = 9.56 years, *SD* = 6.29). Results demonstrated that the intervention group significantly improved their use of plural possessives (e.g., *trees'),* but not singular possessives (e.g., *tree's*) or plurals (e.g., *trees*). The control group did not improve on any word type. Intervention was not successful for children learning to distinguish when to use or avoid capital letters (e.g., *Turkey* vs. *turkey*) with no improvement from either the intervention or control group. A follow-up pilot study of 19 children in Grades 5-6 (13 males; *M* = 11.44 years, *SD* = 9.04) demonstrated greater improvement, suggesting that a certain knowledge level is necessary for successful intervention. A second follow-up study of 26 adults (7 males; *M* = 30.54 years, *SD* = 15.51) indicated that while spellers did use capitals proficiently by adulthood, their use of apostrophes was far from perfect. Contrary to the hypothesis, no systematic patterns emerged between participants' morphological awareness and their ability to use apostrophes and capitals. Implications for future interventions and education are discussed.

The English spelling system, or orthography, represents both phonology (sound structure) and morphology (meaning structure). Two morphological conventions that take several years to master are apostrophes and capital letters (Kemp, 2009). Only a handful of studies have investigated the use of apostrophes, and only a single recent study has been conducted on children's use of capital letters. Capital letters often follow purely orthographic conventions, such as at the start of the sentence, as morphology (meaning) is not involved in guiding the choice of capitalisation. However, in other instances, morphology determines spelling, in that a word's meaning determines whether or not it requires a capital (e.g., the country *Turkey* requires a capital; the bird *turkey* does not). The current study attempted to address these research gaps, by investigating children's use of apostrophes and of morphologically determined capital letters. Specifically, it aimed to investigate whether a short intervention could improve children's ability in these areas, and whether this hypothesised improvement in ability would be reflected in an improvement in morphological awareness.

Morphological Awareness

Morphological awareness refers to the understanding that word parts, such as the apostrophe, carry significance and contribute to the overall meaning of a word (O'Connor, 2014). Morphological awareness is essential for children learning to spell in English, as morphological units often override sound-letter rules in writing (Fowler & Liberman, 1995; Nunes, Bryant, & Bindman 1997). For instance, the inflectional morpheme for regular past tense verbs is always written as *-ed*, even if it is pronounced as /t/, as in *missed.* The focus of the current study are the 'silent morphemes', apostrophes and capital letters, neither of which contribute any sound to a word but can alter its meaning (Hokanson & Kemp, 2012). Understanding the

morphological rules governing these words, even implicitly, is essential for correct spelling. Improving children's morphological awareness has been shown to have a positive effect on children's spelling ability (Nunes, Bryant, & Bindman, 2006).

Apostrophes

Apostrophes represent a particularly challenging deviation from each sound being represented by a letter. In English, apostrophes may indicate either possession or contraction (Stuart, Dixon, & Masterson, 2004). The current study focused on possession (e.g., *tree's, trees'*), contrasting it to plural words (e.g., *trees*), which sound the same but do not require apostrophes. Apostrophes that precede the letter *s* are more complicated to learn than other apostrophes (e.g., in contractions such as *they'll*) because omitting the apostrophe often still creates a word (e.g., *cups*/*cup's*), and the plural (non-apostrophe) version may be the more common form, and thus more easily retrieved from memory. This might explain why children often omit required apostrophes (Treiman & Kessler, 2014). However, as children begin to learn more about apostrophes, they often begin to over-use them in plurals (e.g., *live's* for *lives)*, a tendency which continues in adulthood (Treiman & Kessler, 2014).

Only a few studies have looked at children's apostrophe use, and they have generally concluded that children perform poorly. In a longitudinal study of British children, Bryant, Nunes, and Bindman (2000) found that their 8- to-10-year old participants correctly placed an apostrophe in a possessive noun (such as *bird's*) just over 50% of the time, and did not improve with age. Beard, Myhill, Riley, and Nystrand (2009) speculate that because of the "ritualistic teaching" of putting an apostrophe before an *s* to indicate possession, children become uncertain about dealing with regular plural nouns, which do not require an apostrophe. This was demonstrated by Bryant et al.'s (2000) participants, who overgeneralised by inserting

apostrophes into plurals 46% of the time. Thus, children may need to be better taught about the meaning behind apostrophes, as well as their morphological role (Beard et al., 2009). Indeed, Bryant et al. (2000) found that children's morphological awareness was connected to their eventual success with apostrophe use. Morphological awareness has previously been measured with analogy and oddity tasks (Bryant, Devine, Ledward, & Nunes, 1997; Bryant et al., 2000; Hokanson & Kemp, 2012).

Stuart et al. (2004) investigated the ability of 312 British children aged 6 to 9 years (Grades 2-4) to use contractive and possessive apostrophes. They found that children's tendency to use apostrophes correctly was determined by "token frequency", the overall number of times that each type of apostrophe (possessive or contractive) is seen in the print environment, rather than by "type frequency", the number of different words containing either apostrophe type that are seen in the print environment. This underlines the idea that children write words that reflect what they have been exposed to, rather than in a way that reflects their morphological understanding. This fits with the connectionist viewpoint that spellers are likely to reflect their own print environment input in their spelling output (Houghton & Zorzi, 2003).

Kemp (2009) demonstrated that the difficulties with possessive apostrophes continue in adulthood. She asked 65 undergraduates to write target words to dictation, and found that they correctly omitted apostrophes from plurals 94% of the time, but made significantly more errors in singular possessives (64% correct), and still more in plural possessives (39% correct). A similar pattern of results was demonstrated by Hokanson and Kemp (2012) in a three-week intervention study with 53 undergraduates. At pre-test, adults spelled plurals correctly 88% of the time,

singular possessives 53% of the time and plural possessives 28% of the time. There was a significant improvement post-intervention, with singular possessives spelt correctly 80% of the time and plurals at ceiling levels. However, undergraduate participants in Hokanson and Kemp's (2012) study still incorrectly spelt plural possessives more than half the time. Therefore, even after intervention we cannot necessarily expect high performance from children, and so findings must be considered in relation to actual adult performance, rather than with the expectation of perfect performance.

Only one previous study has investigated children's ability to use plural possessives (such as *trees'*). Leong (2009) found that 141 Canadian children aged 9-12 years (Grades 3-6) used plural possessives correctly only 9% of the time after three 30-minute teaching sessions, compared to 53% correct for singular possessives. Leong (2009) conducted these teaching sessions for ten inflectional morphology categories including plural possessives. The teaching sessions consisted of multiple strategies for morphological understanding, and used practice examples and discussion. Leong (2009) found a developmental trend from Grade 3 to 6. Although three teaching sessions took place, pre-test performance was not measured and thus it is unclear whether intervention was effective for children's learning of plural possessives. The current study aimed to address this gap by investigating whether children's use of plural possessives could be improved through intervention.

The question of whether teaching can increase children's ability to use apostrophes was also addressed by Stuart et al. (2004). They found that apostrophe use was not entirely dependent on teaching, as students in Grade 2 (aged 6 years) were able to use apostrophes correctly 14% of the time, in the absence of explicit teaching. Stuart et al. (2004) proposed that children may have generalised an

understanding from reading to their own writing. However, the importance of teaching was also emphasised, as the researchers found that a difference in ability to correctly use apostrophes in contractive as compared to possessive *s* was only seen in Grade 3 students who had only been taught contractive *s*. Those in Grade 2 (who had not been taught either form) and Grade 4 (who had been taught both) showed no preference for either form. A limitation of Stuart et al.'s (2004) findings is that they were unable to determine whether the use of apostrophes was overgeneralised. Therefore the current study also included plural *s*, to determine children's ability to distinguish when it is and is not appropriate to use an apostrophe.

In addition to exposure to apostrophes in the classroom, providing a focused intervention to help children learn possessive apostrophes has been found to be effective. Bryant et al. (1997) conducted an intervention study for 75 British children aged 9 to 12 years (Grades 4-6) to investigate at what age children were capable of learning to correctly use apostrophes. At pre-test children completed a sentence cloze passage task, spelling target words (with plural *s* or possessive *'s*) to dictation. There were three groups: the first, an intervention group, was taught to omit apostrophes from plurals and to correctly use apostrophes for singular possessives. Children were presented with an image, a corresponding sentence was read aloud, and children were asked to explain which of two spellings options (*s* or *'s*) was correct, and why. The second group was a taught control group who were taught about an unrelated linguistic rule, and the third was an untaught control group who received no intervention. Children in the two control groups, as well as children aged below 10 in the intervention group, showed no significant improvement. The intervention participants aged 10 years and older improved significantly between pre- and post-test when given just a 30-minute intervention. However, the pre- and post-test tasks

were identical, and thus it is plausible that practice effects could have influenced the increase in apostrophe use. Further, the durability of this effect was not established, as the researchers tested the students only a day after the intervention was conducted. Thus, the current study was designed to have seven days between intervention and post-test to determine whether the results endured at a more educationally relevant interval.

Whether children below the age of 10 years can successfully use possessive apostrophes has not yet been established. Cordeiro, Giacobbe, and Casden (1983) observed an increase of 16% to 56% correct after a single teaching session for six Grade 1 students (aged 6-7 years). However, students were found to overgeneralise the rule (e.g., *like's* for *likes*). This overgeneralisation suggests that the children had not fully understood the morphological concept underlying the rule. Following their initial study, Bryant et al. (1997) conducted a follow-up, and their findings in this second sample indicated that the youngest grade (Grade 4) did improve following intervention and the authors dismissed their initial finding as a chance result. Thus, due to the small number of studies which have investigated apostrophe ability in this age group, and the apparent fragility of any intervention effects, this ability warrants further investigation.

In Australia, children are expected to use apostrophes and capitals correctly by Grades 3-4 (aged 7-8 years, Winch, Johnston, March, Ljungdahl, & Holliday, 2010),whereas children in England do not begin to learn about apostrophes until age 10 (Bryant et al., 1997). Bryant et al. (1997) speculated whether the lack of improvement in their first study was due to minimal prior exposure to apostrophes, or to their participants' age. Their second study suggested it may be due to lack of exposure. Given the younger age in which children in Australia are taught about

apostrophes, the current study could add extra insight to this question, especially as no previous studies looking at children's use of apostrophes have been conducted in Australia.

Capitalisation

A second aspect of spelling that relies on morphology is the use of capital letters. Capitalisation has several functions, such as indicating the beginning of the sentence, and marking proper nouns and their derivations (e.g., *Germany*, *German*). In English, the first person pronoun *I* is also capitalised. As with apostrophes, there is no phonological, or sound-based, foundation for capitalisation; both the uppercase and lowercase versions of a letter produce the same sound. There is very little research on children's use of capitalisation, and the majority is anecdotal or preliminary (Treiman & Kessler, 2014). A number of the studies that do exist are quite dated, but they can still offer useful data in building a picture of children's capitalisation ability.

The existing research suggests that children make more errors in capitalisation when they have to consider the word in the context of the sentence (e.g., differentiating between *turkey*/*Turkey*), rather than when they are simply following an orthographic convention where context does not need to be considered (e.g., first-person pronoun *I* must always be capitalised). In an early study, Geoghegan and Fitzgerald (1935) analysed 748 personal letters written by children (aged 10-11 years) and found that the greatest number of errors in capitalisation were in omission of a capital in the first word of a sentence (4.9% of all grammatical errors made), unnecessary use of capitals (2.5%), and failure to use capitals in proper names (2.0%). Children produced fewer errors in days of the week (0.6%), months of the year (0.2%) and in *I* (0.1%).

This tendency for children to show greater competence with capitalisation that requires only a graphic understanding was also detected by Odom (1962) who found a large difference in the success rate of 9- to 12-year-old children's capitalisations of *Mother/Father* (6% correct) compared to names of countries (67% correct) despite both skills being taught at the same grade level. Odom (1962) proposed that the difference was due to the difficulty of the rule children had to apply: for countries, the application of a rote-learned rule (from which learning could be generalised), but for *Mother/Father*, the learning of a more complex set of rules, for which greater teaching instruction was necessary.

More recently, Treiman and Kessler (2004) collated, from a set of five previous studies with children in Kindergarten to Grade 2, the dictated spellings of both words and non-words which did not require a capital letters. They found that children used capitals in a non-random way. At the age of 6, they were more likely to capitalise letter at the beginning of a word than in any other position. When children did capitalise letters in other positions, it was most often (40% of the time) the letter that their first or last name began with, perhaps because children are most frequently exposed to this letter in capitalised form (Treiman & Kessler, 2004).

Patterns of capitalisation may reflect the frequency with which children are exposed to items being capitalised, and their memory for these. Frequency of exposure has been demonstrated to increase acquisition in other areas of orthography, such as the spelling of irregular graphemes (Martinet, Valdois, & Fayol, 2004). For instance, spelling of irregular graphemes, such as *gu* which precedes *e, i, y* (e.g., *guide*) would increase in accuracy the more often an individual is exposed to words that contained this grapheme. Thus, due to frequency of exposure, children begin by learning patterns of capitalisation which require only a graphic

understanding (e.g., the leftmost letter of text is capitalised), rather than any linguistic awareness (Treiman & Kessler, 2014).

There is agreement that capitalisation rules which require only a graphic understanding are easier for children to acquire and apply than those which require a morphological understanding. However, there are inconsistencies as to what constitutes graphic or morphological understanding. For instance, there are two potential theoretical interpretations as to whether capitalisation at the beginning of a sentence is a simple rule that requires graphic understanding (Treiman & Kessler, 2014; Vernon & Ferreiro, 1999) or a more complex rule which requires a contextual understanding (Geoghegan & Fitzgerald, 1935; Odom, 1962).

The Current Study

The current study was designed to address several gaps in the literature. Australian children took part in an intervention study for plurals and possessive apostrophes (both singular and plural) *or* for capital letters. The aim was to determine whether this short intervention could improve correct apostrophe or capitalisation use in children in Grade 3 and 4 who were taught about the concepts behind the use of apostrophes, or about the use of capital letters. Each intervention group thus acted as a control for the other for their taught morphological rule. Nunes and Bryant (2009) note that the components of successful teaching include statements of the rules, practice of examples, and comparisons that do and do not fit the rules. Thus, these components were applied in the current study.

The Grade 3-4 (8-10 year) age range was chosen as previous literature is unclear as to whether or not intervention is successful in this age group. It was hypothesised that participants who received the apostrophe intervention would improve (from pre- to post-test) in the spelling of plurals, singular possessives and

plural possessives. Secondly, it was hypothesised that participants who received the capitalisation intervention would show greater improvement in the capitalisation of proper nouns, and their use of lowercase for common nouns. Children's improvement in both apostrophes and capitalisation ability was hypothesised to depend on the extent of their morphological awareness.

Method

Participants

The initial child sample comprised of 65 students from three local primary schools. Ten students did not complete all three sessions, which left 55 participants (24 male) in Grades 3 (n = 23) and 4 (n = 32). Participants had an age range of 8.67 – 10.41 years (M = 9.56, SD = 6.29). All spoke fluent English, although five children spoke an additional language. The participants' mean spelling ability score was 108.07 (SD = 12.98, range 84-145), as measured by the spelling subtest of the Wide Range Achievement Test–4 (WRAT-4; Wilkinson & Robertson, 2006), on which the standard score is 100 (SD = 15). Initial analysis showed no significant difference between the standardised spelling scores of multilingual children and monolingual English speakers ($F(1,53) = .03$, $p = .869$, $\eta_p^2 = .001$), and thus all participants were retained for further analysis.

Materials

The study included a measure of spelling production and of morphological awareness with two counterbalanced forms of each for use at pre- and post-test.

Spelling production task. The spelling production task was designed to measure participants' ability to spell apostrophes and capitals. Two parallel forms of the task were developed, each requiring participants to spell 23 target words to

dictation. As shown in Table 1, in both forms of the task, there were 15 target words in the apostrophe condition and eight target words in the capital condition.

Table 1

Sentences and Word Types included in Each Version of Spelling Production Task.

Sentence Type	No. of Words	Word Type	No. of Words	Example
Apostrophe	15	Plural	5	The hungry boy ate up his *peas.*
		Singular Possessive	5	My *brother's* ball is flat.
		Plural Possessive	5	The two *bats'* heads hang down when they sleep.
Capital	8	Proper Noun	4	We went on a plane to *Turkey*.
		Common Noun	4	They had roast *turkey* for dinner.

The sentence context was used to cue the correct grammatical form of each target word. For example, in the sentence '*The two bats' heads hang down when they sleep*', the use of *two* indicates that the word must be pluralised, and the noun *heads* indicates that it is possessive. Similarly, for the sentences testing the use of capital letters, the targets were words in which capitalisation was dependent on context, as *Turkey* (the country) versus *turkey* (the bird).

Where possible, all target words were placed as the final word in the sentence, to ensure the greatest amount of preceding context. No target word was longer than two syllables in length and all had relatively high written frequencies

(Mitchell & Brady, 2014) with a Standard Frequency Index (SFI) of between 41.9 and 63.5 (M = 53.82, SD = 6.12) which meant that they would be expected to be in the vocabulary of children of this age range[1].

The two parallel forms of the spelling production task were developed to ensure that the target words in each were carefully matched for structure and frequency. The words in the apostrophe condition were selected to ensure that both forms of the task included five sentences containing a target with each of the following endings: a vowel sound (e.g., *pea*), an unvoiced consonant (e.g., *jacket*), a voiced consonant (e.g., *bed*), a sibilant requiring the plural *es* (e.g., *peach*) and *y* requiring the plural *ies* (e.g., *bully)*. The words in the capitals condition could be written with or without a capital, depending on their status as proper or common nouns. Thus, if Form A contained *peaches* and *china*, Form B contained *beaches* and *China*. Appendix A displays both versions of the task.

Pilot study. Before finalising the spelling production task, a pilot study was conducted with eight adults to help ensure that the two versions of the task were balanced. Because participants consistently scored higher on one version than the other, two items were swapped to try to equate the difficulty levels. Additionally, participants commented that in some passages it was ambiguous whether a plural or singular possessive was necessary. To clarify the grammatical form required, illustrations were added to remove any ambiguity. A second pilot study of ten adults was then conducted with these amendments. Mean scores revealed that the two versions of the task were better balanced in difficulty, and the illustration-supported task was seen as more attractive and engaging than the previous text-only form.

[1] The Standard Frequency Index (SFI) is an estimate of frequency per million (Zeno, Ivens, Millard, & Duvvuri, 1995). The higher the word's SFI the more likely it is to have been read in text by the average person (Koch-Weser, Rudd, & DeJong, 2010).

Morphological awareness task. The researcher-developed task (based on Bryant et al., 1997; Hokanson & Kemp, 2012) was used to assess morphological awareness. The task required participants to identify the 'odd-one-out' of three spoken sentences, in which one sentence contained a different type of target word from the other two. Participants saw the written stem of each sentence (without the target word), but heard the whole sentence pronounced aloud by the researcher, including the target word. Participants completed both an apostrophe condition (four items) and a capitalisation condition (four items). For the apostrophe items, two sentences contained a plural noun and one contained a possessive noun. For the capitalisation items, two sentences contained a noun that required a capital and one contained a noun that did not require a capital. Thus, the participants were required to select the possessive noun (*bird's* or *hospital*, respectively) as the odd one out. An example of each is presented in Table 2.

Table 2

Examples of the Morphological Awareness Task Items for Each Condition.

Apostrophe Condition	Capitalisation Condition
a) The *balls* bounced high.	a) My dad just came home from *Sydney.*
b) The *plates* are rather dirty.	b) My dad just came home from *Woolworths.*
c) The ***bird's*** beak is yellow.	c) My dad just came home from ***hospital***.

Note. Target words are italicised and with the correct answer in bold.

Pilot Study. The initial pilot group (n = 8) completed an earlier version of the morphological awareness task in which the items were only read aloud, with no written support (as in Bryant et al., 1997; Hokanson & Kemp, 2012). The

participants found this task quite difficult, and thus it was decided to provide the stem of the sentence to reduce reliance on short-term memory to complete the task. Further, one version proved slightly more difficult than the other, and so two items were exchanged to ensure the versions were better balanced. The second adult pilot group (n = 10) completed the modified versions of this task. Mean scores suggested that the two versions of the task were balanced. These pilot participants had no further involvement in the study.

Procedure

Ethics approval was obtained from the University of Tasmania's Human Research Ethics Committee (Appendix B) and from the Department of Education's Educational Performance Research Committee (Appendix C). Informed consent was obtained from the school principals, the parents of participants (for children) and the participants themselves (Appendix D).

The participants attended three 45-minute sessions, one week apart, in groups of approximately ten participants. During the first (pre-test) and third (post-test) sessions, the participants completed the spelling production task and the morphological awareness task (in that order).

Pre-Test. At pre-test, the experimental materials were presented in a booklet, which also collected demographic details and WRAT-4 spelling responses.

***Spelling production task*.** Participants were presented with illustrated written sentences (in 14-point Arial font) from which the target words had been omitted, with underlined spaces where target words were to be written, as shown in Figure 1.

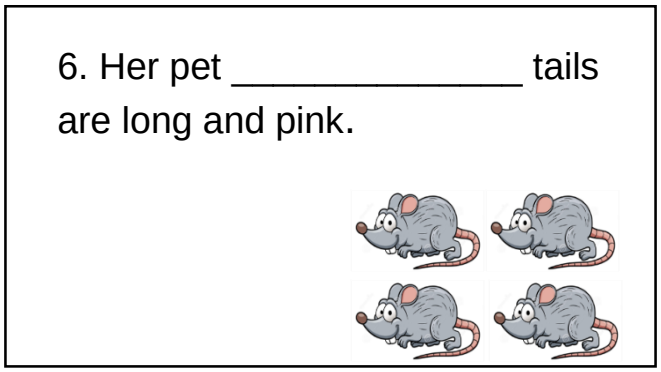

Figure 1. Example of item in spelling production task.

The researcher read aloud each sentence, with emphasis on the target word, which she repeated at the end. Participants were asked to write the target in the blank spot (e.g., "*Her pet _____(rats') tails are long and pink*"). The order was randomised differently for each group session to reduce potential teacher or school effects.

Morphological awareness task. The researcher read aloud each item's practice set of three sentences, emphasising the target word. The practice item was then repeated, and the participants were asked to mark which sentence they believed to be the odd one out. The stem of each sentence was printed in 16-point Arial font. Feedback was provided about the correct answer for the practice set. No feedback was given during the test items. The order of both the test items and position of the correct answer were randomised for each group session.

WRAT-4. Participants completed the spelling subtest of the WRAT-4, which contains 42 real words of increasing difficulty which are spelt to dictation.

Intervention. Twenty-seven participants were randomly allocated to the apostrophe intervention and 28 to the capital intervention group. The interventions took place in one 45-minute session between the pre- and post-test. A script was closely followed to ensure that the intervention was the same for all groups, as shown in Appendix E.

Apostrophe condition. For the apostrophe group, the intervention involved developing an understanding of plurals, singular possession and plural possession and the differences between them. This occurred through a series of illustrated interactive activities, aimed at making conceptual distinctions between the spellings of these types of words. For example, children were asked what the plural of nouns such as *frog* would be (*frogs*), and how you indicate in writing that the noun possesses something (e.g., *the frog's tongue*). Students were then asked to think about plural possession – when it was both a plural and had possession (e.g., *the frogs' lily pads*). This was completed for a range of different plural endings (e.g., adding *es* to *witch*, or *ies* to *bunny*). Children were asked to write down their responses and were provided with feedback.

Capitalisation condition. A similar format was used for the capitalisation intervention. Initially children practised using capital letters for countries and days of the week. The difference between lowercase and uppercase was discussed, and a group discussion was led around when a capital needed to be used (start of a sentence, *I*, proper nouns), including in common versus proper nouns (e.g., a *chocolate* bar vs a *Mars* bar). Children were asked to write the words down, and feedback was provided.

Post-test. Participants completed the spelling production and morphological awareness tasks in their parallel forms.

Results

Spelling Production Task

Apostrophe spelling task. Each word in this task was scored as correct (1), or incorrect (0). Scoring was based on the target ending only, not on the whole base word. For example, *fleas* spelt as *flees* was considered correct, but *fox's* spelt as *foxes*

or *foxes'* was not. Raw scores were converted to proportions. Approximately 20% of the tests were marked by a second rater to ensure inter-rater reliability, and any disagreements were resolved through discussion.

Figure 2 displays the means and Standard Error of the Mean (SEM) for the two groups' pre- and post-test spelling of the apostrophe condition items. It can be seen that the two groups showed inconsistent patterns of results on the pre-test, although both did much better on plurals than on singular possessives, and most poorly on plural possessives. Overall, those in the apostrophe intervention group appeared to show improvement following intervention on their use of singular and plural possessives. Their use of plurals remained the same between pre- and post-test. Those in the capitalisation intervention group improved in their use of plurals, and showed slight improvement in their use of singular possessives. The capitalisation group had no success with possessive plurals before or after intervention.

A one-way Analysis of Variance (ANOVA) revealed that by chance, the children in the capitalisation intervention group had a significantly higher mean standardised WRAT spelling score (112.82, SD = 14.20) than the children in the apostrophe group (103.15, SD = 9.53), $F(1, 53) = 8.73$, $p = .005$, $\eta_p^2 = .141$. For this reason, it was decided to use participants' pre- to post- test difference scores (rather than their raw scores) as the dependent variable in the main ANOVA. The mean differences and the SEMs are presented in Figure 3. The independent variable was word type, which was a within-subjects factor with three levels: plural, singular possessive, plural possessive. The between-subjects factor was intervention group, which had two levels: apostrophe intervention group and capital intervention group. All analyses were conducted at an alpha level of .05.

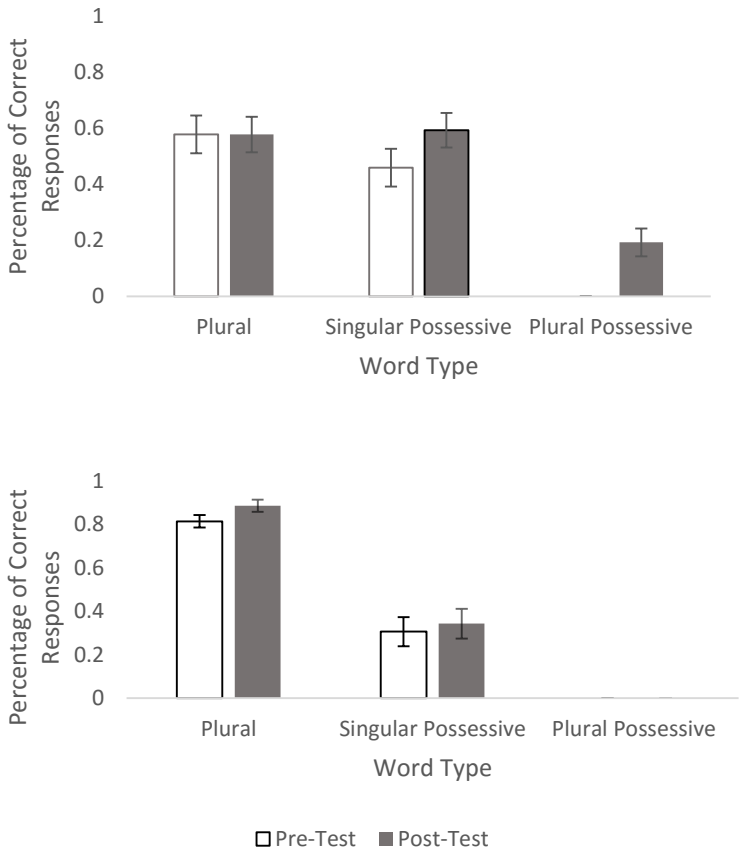

Figure 2. Mean scores and SEMs of the apostrophe intervention group (top panel) and capital intervention group (bottom panel) at pre- and post-test on apostrophe items.

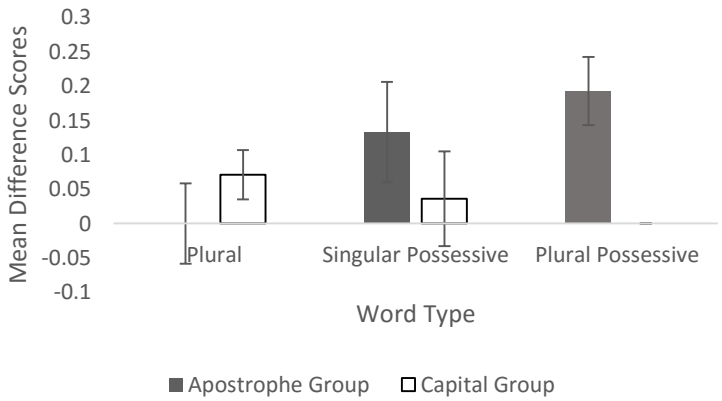

Figure 3. Means and SEM for the difference scores at pre- and post- test by intervention condition.

The ANOVA revealed that there were no significant main effect of word type following a Greenhouse-Geisser correction, $F(2,89) = .80$, $p = .431$, $\eta_p^2 = .015$, nor of intervention group, $F(1,53) = 2.78$, $p = .101$, $\eta_p^2 = .050$. However, the analysis revealed a significant interaction between word type and intervention group, $F(2,89) = 3.48$, $p = .043$, $\eta_p^2 = .062$, following a Greenhouse-Geisser correction.

Planned contrasts were conducted to determine where significant differences lay. Two one-way ANOVAs, with Bonferroni adjustments, revealed no significant difference between the two intervention groups in their use of plurals, $F(1,53) = 1.10$, $p = .299$, $\eta_p^2 = .020$, or singular possessives, $F(1,53) = 1.06$, $p = .308$, $\eta_p^2 = .020$. However, there was a significant difference between the intervention groups on plural possessives, $F(1,53) = 15.72$, $p < .001$, $\eta_p^2 = .229$. The apostrophe intervention improved from 0% to a 19% correct at post-test, but the capital intervention showed no improvement at all. Therefore the intervention significantly improved the spelling of plural possessives, but not plurals or singular possessives.

For the apostrophe intervention group, Bonferroni-adjusted repeated measures ANOVAs revealed no significant difference in improvement between plurals ($M = .00$, $SD = .30$) and singular possessives, ($M = .13$, $SD = .38$), $F(1,26) = 1.84$, $p = .187$, $\eta_p^2 = .066$, nor between their improvement in singular possessive and plural possessives ($M = .19$, $SD = .26$), $F(1,26) = 0.60$, $p = .448$, $\eta_p^2 = .022$ following Greenhouse-Geisser adjustments. For the capitalisation intervention group, a Bonferroni-adjusted repeated measures ANOVA also revealed no significant difference in improvement between plurals ($M = .07$, $SD = .19$) and singular possessives ($M = .04$, $SD = .32$), $F(1,27) = 0.26$, $p = .617$, $\eta_p^2 = .009$. Additionally, there was no significant difference between their use of singular possessives ($M =$

.04, *SD* = .32) and plural possessives (*M* = .00, *SD* = .00), *F*(1,27) = 0.34, *p* = .562, η_p^2 =.013 following Greenhouse-Geisser adjustments.

Capital spelling task. The scoring of the capital condition was based on whether the first letter of the word was capitalised or not, regardless of the spelling of the rest of the word. If upper and lower cases of a target letter were of the same visual form (e.g., *S* and *s*) the target letter was judged to be capitalised if it was noticeably larger than the following lowercase letters. If upper and lower cases of a target letter were of visually different forms (e.g., *T* and *t*), then the form itself was considered, regardless of its size in relation to the following lowercase letters.

As shown in Figure 4, participants in the two intervention groups performed similarly on capitals at pre-test, with both groups more likely to correctly avoid the use of capitals than to correctly use them. Those in the capital condition remained stable over time, whereas those in the apostrophe intervention had a lower score at post-test in their use of capital letters.

Again, participants' pre- to post-test difference scores (rather than their raw scores) were used as the dependent variable in the main ANOVA, due to the initial difference in the groups' standardised spelling ability. These mean difference scores are presented in Figure 5. The independent variable for this ANOVA was word type, which was a within-subjects factor with two levels: capital required or not required. The between-subjects factor was intervention group, which had two levels: apostrophe intervention group and capital intervention group. All analyses were conducted at an alpha level of .05.

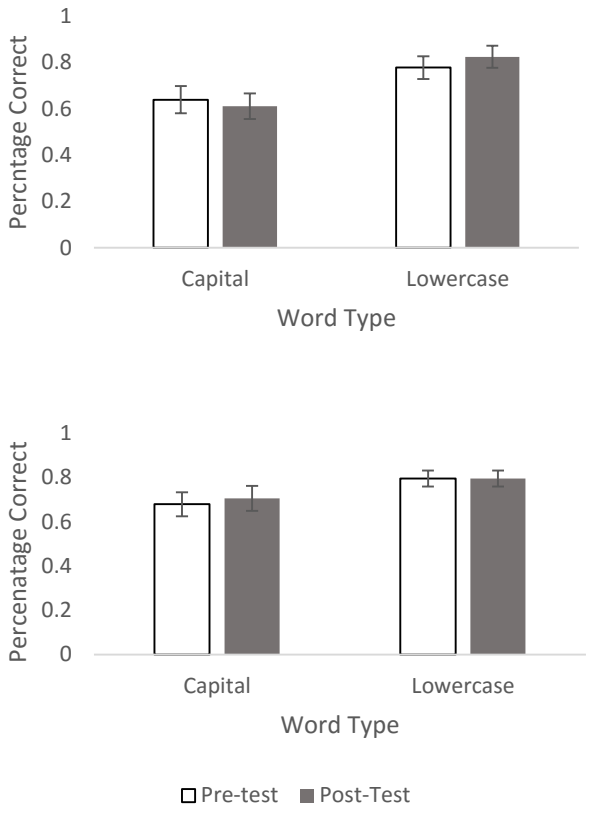

Figure 4. Means and SEM proportions in the correct use of capital letters for participants in the apostrophe intervention (top panel) and capital intervention (bottom panel) at pre- and post-test.

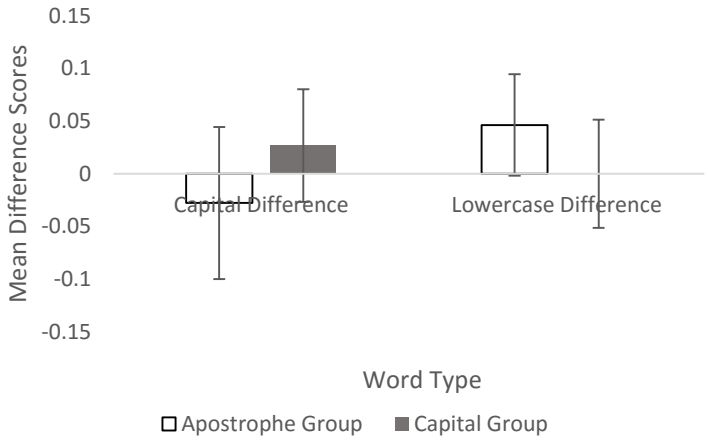

Figure 5. Means and SEM for the difference scores at pre- and post- test by intervention condition.

A 2x2 ANOVA of the difference scores was conducted to determine whether the intervention produced significant improvement in the correct use of capital letters. There was no significant main effect of word type, $F(1, 53) = 0.19$, $p = .668$, $\eta_p^2 = .003$, following a Greenhouse-Geisser correction, nor of intervention group, $F(1,53) = 0.01$, $p = .944$, $\eta_p^2 < .001$. Finally, there was no significant interaction between word type and intervention group, $F(1,53) = 0.85$, $p = .362$, $\eta_p^2 = .016$, following a Greenhouse-Geisser correction.

Error Analysis

An error analysis was conducted to examine the kinds of errors that both groups made on the words in the apostrophe task, as shown in Table 3.

The relatively low correct spelling of plurals, especially by the apostrophe intervention group at pre-test, perhaps paints a poorer picture of their ability than is appropriate, as it may be underestimating participants' ability to correctly omit an apostrophe in plurals. Scores in this category incorporate spelling which correctly included an *s* at the end of the word, but did not show the appropriate plural ending (e.g., *bellys* for *bellies*).

Table 3

Mean Proportions (and SDs) of Each Type of Error Made in Spelling Production Task for Apostrophe Items by both Intervention Groups.

Intervention Group			Plurals		Singular Possessives		Plural Possessives	
		Example	Pre-test	Post-Test	Pre-Test	Post-test	Pre-Test	Post-Test
Apostrophe	Omission of ’	*sisters* for *sister’s*	-	-	1.93 (1.82)	1.52 (1.55)	2.63 (1.52)	1.96 (1.34)
	Intrusive ’s	*peach’s* for *peaches*	1.44 (1.72)	1.30 (1.41)	-	-	1.74 (1.58)	1.67 (1.36)
	Intrusive s’	*peaches’* for *peaches*	.00(.00)	.11 (.32)	.00 (.00)	.04 (.19)	-	-
	Unconventional ending with ’	*peach’es* for *peaches*	.26 (.53)	.19 (.48)	.33 (.73)	.19 (.48)	.11 (32)	.30 (.72)
	Unconventional ending w/o ’	*peachs* for *peaches*	.41(.64)	.26 (.59)	.37 (.56)	.11 (.32)	.48(.85)	.26 (.53)
	Ending omitted	*peach* for *peaches*	.04(.19)	.15 (.46)	.04 (.19)	.22 (.51)	.04 (.19)	.07 (.38)
	No/wrong word	*tree* for *peaches*	.00 (.00)	.00 (.00)	.04 (.19)	.00 (.00)	.00 (.00)	.00 (.00)
Capital	Omission of ’	*sisters* for *sister’s*	-	-	2.86 (1.82)	2.71 (1.76)	3.79 (1.34)	3.57 (1.62)
	Intrusive ’s	*peach’s* for *peaches*	.11 (.31)	.04 (.19)	-	-	.64 (1.13)	1.04 (1.55)

Intrusive s’	*peaches’* for *peaches*	.00 (.00)	.00 (.00)	.00 (.00)	.00 (.00)	-	-
Unconventional ending with ’	*peach’es* for *peaches*	.04 (.19)	.00 (.00)	.07 (.26)	.07 (.26)	.00 (.00)	.11 (.42)
Unconventional ending w/o ’	*peachs* for *peaches*	.79 (.69)	.54 (.74)	.43 (.69)	.32 (.67)	.50 (.79)	.25 (.44)
Ending omitted	*peach* for *peaches*	.04 (.19)	.00 (.00)	.21 (.57)	.14 (36)	.07 (.26)	.04 (.19)
No/wrong word	*tree* for *peaches*	.00 (.00)	.00 (.00)	.00 (.00)	.04 (.19)	.00 (.00)	.00 (.00)

Note. *w/o* without, max number of errors= 5.

Table 3 also demonstrates that the most common error for both singular and plural possessives at pre- and post- test was the omission of an apostrophe. For singular possessives and plurals, all errors, with the exception of 'ending omitted', reduced between pre- and post-test. This was also the case for plural possessives, but there was a rise 'unconventional endings with an apostrophe'. Again, this incorporates instances where the participant correctly placed the apostrophe but did not include the correct plural ending, resulting in non-existent spellings (e.g., *ladys'* instead of *ladies'*).

Morphological Awareness

Responses on the morphological awareness task were scored out of four for both capitals and apostrophes. The mean number of correct responses for each intervention group is presented in Figure 6. As can be seen, those in the apostrophe intervention group did improve on the apostrophe items of the morphological awareness task between pre- and post-test, but this was also true for those in the capitalisation intervention group. While the apostrophe intervention group improved on the capitalisation items, the capitalisation intervention group did not; the reverse of what was expected.

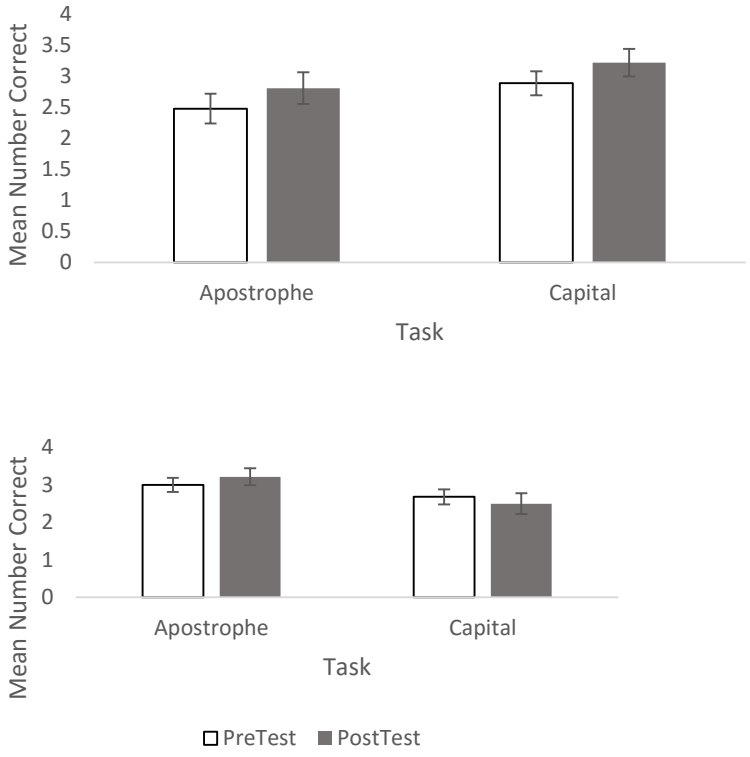

Figure 6. *Mean number correct and SEM in morphological awareness task for the apostrophe intervention group (top panel) and the capital intervention group (bottom panel).*

To determine whether performance on the pre- and post-test morphological awareness task and WRAT ability was associated with participants' ability in the spelling production task, a series of bivariate correlations were conducted for each intervention group. Caution was exercised in interpreting these correlations due to the small sample sizes. However, no systematic patterns emerged in terms of the relationships between performance on the morphological awareness task and the spelling production tasks (see Appendix F for tables of correlations). This suggests that the morphological awareness tasks were perhaps not tapping into the underlying morphological awareness that they were intended to, and/or that other factors are also being measured by the tasks.

Follow-up Study

It was proposed that the relatively limited response to intervention seen in the Grade 3-4 sample (8-10 years) may have been due to these children being too young to fully understand the morphological concepts required to spell apostrophes and capitals correctly. Bryant et al. (1997) noted that the youngest children in their initial study, who were 9 years old, demonstrated no significant increase between pre- and post-test. However, Bryant et al.'s (1997) 10- to 12-year-old participants did show significant improvement. Therefore, in the current study, a small group of 10- to 12-year-old children in Grades 5 and 6 (n = 19) participated in the pre-test activity to examine whether these children initially spelt the words significantly better than their Grade 3-4 peers, which may facilitate a more effective intervention.

Finally, to investigate whether it was plausible to expect children to be able to perform at ceiling levels in any of their spelling production even after intervention, a comparative adult sample completed the pre-test tasks.

Method

Participants. This follow-up study included 19 students (13 male) in Grade 5 (n = 10) and 6 (n = 9), aged 10.58-12.58 years (M = 11.44, SD = 9.04). Their mean spelling score on the WRAT-4 was 99.47 (SD = 12.93, range 72-116). While two students spoke an additional language, there was no obvious difference between these students (M = 104.00, SD = 9.99) and monolingual English speakers (M = 98.94, SD = 13.39) on their WRAT scores (no statistical analysis was conducted given the small ns).

A comparative sample of 26 adults (7 male) was also included, with an age range of 18-66 years (M = 30.54, SD = 15.51). All participants were fluent speakers of English and had a mean spelling score on the WRAT of 114.38 (SD = 13.70,

range 91 to 145). First-year psychology students (n = 7) received course credit, while the rest participated voluntarily.

Procedure.

Grades 5 and 6. All 19 students completed the pre-test spelling production task, the WRAT spelling subtest, and the morphological awareness task. A subset of these children (n = 8) then also completed the intervention and the post-test tasks, as previously described for the Grades 3-4 students.

Adults. Adult participants completed only the pre-test tasks, in one individual half-hour session.

Results

Spelling production task.

Grades 5 and 6. For the purposes of comparison, all children were included in these analyses, regardless of whether they also participated in the intervention and post-test. As seen further below in Figure 7, the Grades 5-6 children had a greater initial correct response rate than Grades 3-4 children, in all items except for those which did not require a capital letter. There was a significant difference between the two age groups in their use of apostrophe word types, with those in Grades 5-6 being more likely to use them correctly (M = .43, SD = .18) than in Grades 3-4 (M = .34, SD = .12), $F(1,82) = 6.46$, p =.013, η_p^2 = .073. There was no significant difference between Grades 5-6 (M =.74, SD = .18) and Grades 3-4 (M = .74, SD = .21) in overall capitalisation ability, $F(1,82) = 0.01$, p = .912, η_p^2 <.001. Therefore, it appears that for plurals and possessives, at least, children in Grades 5-6 can use spelling patterns better than those children in Grades 3-4. Therefore intervention may be more successful for this Grade 5-6 group.

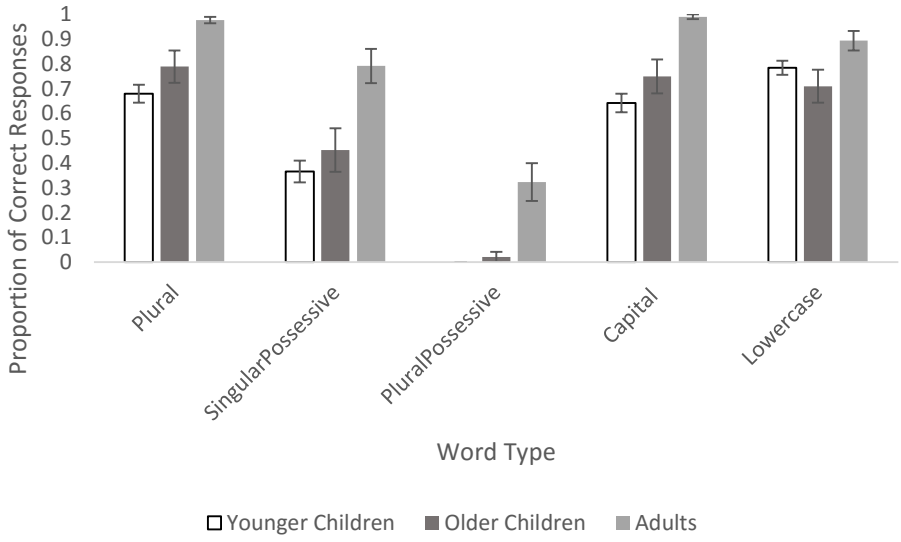

Figure 7. Mean Proportion (and SEM) of correct pre-test responses for all age groups.

A subsample (*n* = 8) of these Grades 5-6 children also completed the intervention and post-test tasks. Due to this small sample size, no reliable analysis could be conducted, and so only descriptive statistics were considered. The five children in the apostrophe intervention improved in both their use of plurals (from a mean of .76 (*SD* = .22) correct to .88 (*SD* = .18)) and singular possessives (from a mean of .28 (*SD* = .30) to .36 (*SD* = .30)), although they were never correct on plural possessives. The three children in the capital intervention group performed at ceiling levels (*M* = 1.00, *SD* = 0.00) at pre-test when capitals were required, and at .92 correct (*SD* = .14) at post-test. However, when capitals were not required, participants were correct only .58 (*SD* = .14) of the time at pre-test, but this rose to a mean of .92 (*SD* = .14) at post-test. On the basis of this small sample, it appears that intervention may be more successful with slightly older children.

Adults. As shown in Figure 7, adults did not reach ceiling levels in their use of singular or plural possessives. They correctly used plural possessives only around

one-third of the time, and singular possessives about three-quarters of the time. Adults reached ceiling levels for both plurals and words requiring capitalisation, suggesting that these are areas in which children will eventually show greater improvement.

A 3-way repeated measures ANOVA was conducted on the adults' spelling of the words in the apostrophe condition, with a within-subjects factor of word type, which had three levels, plural, singular possessive and plural possessive. It revealed a significant main effect of word type, $F(2,46) = 38.89$, $p < .001$, $\eta_p^2 = .609$ following a Greenhouse-Geisser correction. Bonferroni-corrected planned contrasts revealed that adults were significantly better in their use of plurals than singular possessives, $F(1,25) = 7.50$, $p = .011$, $\eta_p^2 = .231$, and significantly better in their use of singular possessives than plural possessives, $F(1,25) = 28.88$, $p < .005$, $\eta_p^2 = .536$. A 2-way repeated measures ANOVA for the capitalisation condition (capital required/ lowercase required), revealed that adults were significantly better at correctly using capitals than correctly using lowercase letters, $F(1,25) = 5.30$, $p = .030$, $\eta_p^2 = .175$.

There was a significant difference between adults and children (in Grades 3-4) in their use of the apostrophe word types with adults using them correctly a greater proportion of the time ($M = .69$, $SD = 19$) than children ($M = 36$, $SD = 15$), $F(1,79)=69.90$, $p<.001$, $\eta_p^2=.469$. There was also a significant difference between the groups in their correct use of capitalisation, with adults using a greater proportion correct ($M = .95$, $SD = .10$) than children ($M=75$, $SD=.18$). $F(1,79) = 25.15$, $p < .001$, $\eta_p^2=.241$.

Morphological awareness task. Overall, children in Grades 5 and 6 performed numerically better on the apostrophe items ($M = 3.26$, $SD = 1.04$), than on the capital items ($M = 2.74$, $SD = 1.33$). Adults' mean response rate for the

morphological awareness was near ceiling for both the apostrophe (*M*= 3.92, *SD* = 0.27) and capital items (*M*=3.62, *SD* = 1.02). As shown in Table 4, the subgroup of Grade 5-6 children who also completed the intervention and post-test, improved between pre- and post-test, with the capital intervention group showing greater improvement in their corresponding task**.** However, due to the small number of participants (*n*=8) results are clearly preliminary, Finally, neither children in Grades 5-6 nor the adults in the follow-up study demonstrated a systematic pattern of correlations between scores on the spelling production task and the morphological awareness task (see Appendix F).

Table 4

Mean Number Correct and SD in Morphological Awareness Tasks at Pre- and Post-Test, by Intervention Group.

Intervention Group	MA Apostrophe Task		MA Capital Task	
	Pre-Test	Post-Test	Pre-Test	Post-Test
Apostrophe (*n*=5)	3.40 (0.55)	4.00 (0.00)	3.00 (1.23)	4.00 (0.00)
Capital (*n*=3)	3.33 (1.16)	3.67 (0.58)	1.67 (1.53)	3.67(0.58)

Discussion

The current study examined the effectiveness of a half-hour intervention on children's use of apostrophes and capital letters, and whether this effectiveness was associated with an increase in morphological awareness. It was demonstrated that for children in Grades 3 and 4, intervention was effective in improving the spelling of

plural possessives (e.g., *trees'*). There was a slight improvement in the spelling of singular possessives (e.g. *tree's*), but this did not reach significance, and no improvement in the spelling of plurals (e.g., *trees*). Those in the control group did not significantly improve on any of the three word types. Therefore, the hypothesis that children would improve on their use of apostrophes following intervention was partially supported.

In terms of children's use of capitals, neither those in the intervention group nor in the control group improved in their ability to determine where capitalisation was appropriate or inappropriate. These findings suggest that further investigation is necessary to determine what teaching components are necessary for successful intervention to improve children's use of capitals. This result did not support the hypothesis that children would improve on their use of capital letters following intervention. Finally, the hypothesis that morphological awareness would improve as a result of intervention was not supported, as no systematic pattern of correlations was found between performance on the tasks of spelling production and morphological awareness.

The current study found that the correct use of plurals remained stable between pre- and post- test for children in Grades 3-4 who took part in the apostrophe intervention. Incorrect insertion of an apostrophe occurred 34% of the time at pre-test and 32% at post-test. This is perhaps a more promising result than in previous research, which has found an increase in the overgeneralisation of apostrophes following intervention, resulting in a lower correct use of plurals post-test (57% correct for those aged 10-12 years following intervention, Bryant et al., 1997). It is plausible that the greater improvement in the use of singular possessives observed by Bryant et al. (1997) was at the expense of the correct pluralisation. Thus,

it can be suggested that the current study was more successful in maintaining the semantic distinction between plurality and possessives.

Previous studies in other morphological areas have also revealed a tendency for the initial overgeneralisation of spelling patterns (e.g., the overgeneralisation of the regular verb ending *–ed* to irregular verbs, as in *selled* for *sold*, Nunes et al., 1997). In the current study, the control (capitalisation) group had a much lower rate of intrusive apostrophes in plurals than the intervention (apostrophe) group, but a much higher rate of omitting apostrophes from possessives. This implies that children were applying the single rule (either omitting or including an apostrophe) regardless of word type.

Children in the current study improved in their use of singular possessives regardless of their intervention group. Although this finding was unexpected, it is not unprecedented: Bryant et al. (1997) also saw an improvement in the use of apostrophes in contractive word forms (e.g., *you're*) from pre- to post- test for all groups, despite the intervention having no explicit instruction about contractive apostrophes in the intervention. In both Bryant et al.'s (1997) study and the present study, children may have simply performed better as they became more accustomed to the testing situation. The learning effects in Bryant et al.'s (1997) study may have been even more prominent, as their pre- and post-test measures were identical.

Stuart et al. (2004) found that children in Grades 2 to 4 (aged 6-9 years) were often able to identify that words required an apostrophe, but were unsure of where to put the apostrophe in the word. In the current study, this was not the case for singular possessives, but was for plural possessives. For singular possessives at post-test, children who had completed the apostrophe intervention were much more likely to omit an apostrophe (e.g., *boxs* for *box's*) than to insert an unconventional or intrusive

apostrophe (e.g., *peache's* for *peaches*). However, for plural possessives at post-test, children were just as likely to insert an unconventional or intrusive apostrophe (e.g., *tree's* for *trees'*) as they were to omit an apostrophe (e.g., *trees* for *trees*'). This indicates that following intervention, the students were able to identify that the sentence was indicating possession, but still struggled to recognise that it also required a plural. Therefore, future intervention studies should include further instruction as to how to identify plurality in possessive instances.

The current study's apostrophe intervention group (Grades 3-4) showed a 19% increase in their use of plural possessives after only a single session of intervention. Hokanson and Kemp (2012) found only a 16% increase in adults' possessive plural use following three interventions. The current findings suggest that it is easier for children to learn this morphological rule in tandem with singular possessives, as opposed to being exposed it in later teaching (or not being taught at all). The success rate in the current study was also greater than that found by Leong (2009; 9% correct plural possessive use after three training sessions in Grades 3-6 children aged 9-12 years). However, Leong (2009) was also attempting to educate children on the use of nine other inflectional morpheme rules, which may have been rather overwhelming for participants (Nunes & Bryant, 2009).

A number of studies have found a developmental trend in the ability to correctly use apostrophes (Leong, 2009; Stuart et al., 2004). Stuart et al. (2004) found floor effects for below-median spellers aged 6 and 7 years. This suggests that a certain level of general spelling ability is necessary before apostrophe use can be successfully acquired, and thus a brief intervention would be more successful in older children. McMillan (1999) proposed that this developmental level is necessary to retain knowledge about apostrophes and apply it at a later time point, rather than

the ability to reproduce the surface features in the short-term. This is consistent with the current study, as children (Grades 3-4) were generally able to correctly use all three word types during the intervention but did not always demonstrate this at post-test. The pilot study of 19 children in Grades 5-6 (aged 10-12 years) in the current investigation provides promising evidence for this suggestion. It has been unclear in previous studies whether the lack of improvement seen in the younger children was due to apostrophes being too difficult for children to understand, or to lack of prior teaching of apostrophes (Bryant et al., 1997). The current study suggests the former, as all participants did have some level of prior teaching.

However, as the results of the present study, and previous work show, adults' ability to use possessive apostrophes is not perfect. Therefore it is not plausible to expect children to achieve ceiling levels, even following intervention. Adults in the current study were slightly better at using singular and plural possessives (79% and 32% respectively), than those tested by Hokanson and Kemp (2012, 53% and 28% respectively). Following intervention, these authors' participants significantly improved their use of singular and plural possessives. However, participants still incorrectly spelt plural possessives more than half the time, suggesting that this is a difficult concept for adults to learn. A number of adult participants in current project, and in Kemp's (2009) research, reported never having formally being taught about rules for apostrophe use. This lack of instruction is evidenced by the fact that a number of adult participants did not use any plural possessives, and in lieu used the singular possessive form. Thus, they were able to make the semantic distinction between plurality and possession, but had not been taught the skills to represent more than one possessor.

A second explanation for why adults showed poor performance on their use of possessive apostrophes is that of 'literacy laziness' (Kemp, 2009). In day-to-day situations apostrophes are often omitted, yet the message is still conveyed (Lukac, 2014; Treiman & Kessler, 2014). This is in accordance with the connectionist approach which suggests that the output an individual produces is in direct relation to the input which they receive (Houghton & Zorzi, 2003). Thus, if much of the input omits apostrophes, then people's spelling output will reflect this (Kemp, 2009). Further, multiple written forms of identical-sounding words exist (e.g., *trees, tree's, trees'*), as opposed to other morphemes where alternative forms never occur (e.g., *walkd*) and so apostrophe intrusions and omissions are harder to identify as incorrect. Thus the findings of the current study are in line with the connectionist approach to reading and spelling.

It might seem that since capital letters are governed by simple spelling rules, then their correct use and avoidance might be achieved at a relatively young age. However, as the present study and previous literature suggest (e.g., Geoghegan & Fitzgerald, 1935; Odom, 1962), children even in Grades 5 and 6 have trouble consistently using word-initial capital letters correctly. The current Grade 3-4 participants' lack of improvement between pre- and post- (74% success at pre-test versus 75% success rate at post-test), may suggest that although children master the graphic understanding of capitals at an early age, the associated linguistic awareness takes much longer to develop.

The present results can be interpreted in light of the findings by Odom (1962), who reported that children aged 9-12 years correctly capitalised names of countries 67% of the time, similar to that of the 8- to 12-year old children in the current study. Odom (1962) proposed that children had simply applied rote-

memorisation to correctly apply this rule. However, this is contested here, as some country names also have an alternative meaning when not capitalised (such as *Turkey, China*) meaning that spellers cannot simply apply rote memorisation, and thus must apply a more complex rule.

In the current study, children at pre-test had a much higher success rate for capital letters than they did for apostrophes, with both intervention groups' mean number of correct responses well above chance. However, children in Grades 5-6 performed similarly to children in Grades 3-4 on both the spelling and morphological awareness tasks for capitals, whereas in the apostrophe tasks, children in Grade 5-6 performed better than their Grade 3-4 peers. Further, the adults showed near ceiling performance for capital letters, suggesting that ability to correctly apply capitalisation does develop by adulthood, whereas this is not always the case for apostrophes.

Children who took part in the intervention on capital letters were able to distinguish between words that required and did not require a capital, with ease, during the intervention itself. However, in the experimental tasks, children did not always apply this ability, with participants in the Grade 3-4 capitalisation intervention group improving only slightly (but non-significantly) in their use of capital letters, and maintaining the same rate of correct lowercase use. Cordeiro et al. (1983) found a similar pattern of results in the use of full stops, where children demonstrated knowledge in one writing sample, but not always in the next. This could be because writing is a complex activity, with many parts, and so attention on another level can mean that previously demonstrated knowledge may temporarily disappear in performance (Cordeiro et al., 1983).

The small pilot study of Grades 5-6 children in the current project showed an overall increase in their ability to distinguish between whether capitals were required or not, as they learned not to overuse capital letters. At pre-test, these participants exhibited ceiling levels for capitals, but a low level of success for those which did not require a capital, suggesting that were beginning the target word with a capital regardless of whether it was a proper or common noun. In future studies, it may be beneficial for participants to write the sentence in its entirety to dictation (rather than just the target word within a printed sentence) to minimise the likelihood of participants capitalising it only because it is their 'special' word to write.

It was hypothesised that there would be a relationship between spellers' morphological awareness scores and their success in the spelling production tasks. However, no systematic patterns emerged between the tasks for the two child samples. (The adult sample reached ceiling levels in the morphological awareness task, meaning that no conclusions could be drawn from this sample.) The findings of the current study are in contrast to previous findings. In a longitudinal study, Bryant et al. (2000) found that 8- to 10-year-olds' performance in a word-analogy task of morphological awareness predicted their ability to correctly use possessive apostrophes. However, it is important to note that this task focused on inflectional morphemes, where participants were presented with two words (e.g., *walk* and *walked*) and were asked to perform the parallel transformation on another word (e.g., *shake* and _____ *(shook)*). Inflectional morphemes are easier for children to acquire than silent morphemes (Bryant et al., 1997), and this may be why we did not see significant relationships in the current study, where the morphology task focused on the silent morphemes whose spelling was measured in the spelling production task.

The present results are similar to those found by Bryant et al. (1997), in which participants also improved on the morphological awareness task between pre- and post-test regardless of whether they received the apostrophe intervention. Scores on Bryant et al.'s (1997) morphological awareness task were significantly correlated only with contractive apostrophe use, and this relationship was no longer significant once age and spelling age were controlled for. Bryant et al. (1997) measured morphological awareness using a similar oddity task to the one in the current study. The findings from both studies suggest that perhaps this task is not suitable for measuring morphological awareness in children.

Limitations and Future Directions

Some potential limitations have already been discussed, but others remain. One possible explanation for the lack of improvement in the capital spelling production task between pre- and post-test is that different forms of proper nouns were used in the task, compared to those taught during the intervention. The spelling production task focused on words whose meaning determined their need for capitalisation (e.g., *Turkey/turkey*). In contrast, words used in the intervention such as *Antarctica* and *cold* focused more on the distinction between the two noun forms than the meaning of the words themselves. This was because there is a limited number of words which have different meanings in their upper and lower case forms (as in *turkey*, *daisy*), and these were used at pre- and post- test. We wanted to ensure that children were generalising what they had learnt, and not just using rote memorisation. However this might have made it more difficult for children to use their knowledge of capitals in the post-test task. The proper nouns used in the morphological task were similar to those in the intervention, in that they generally

only had a single meaning (e.g., *hospital*, *Melbourne*). Thus, the morphological awareness task for capitalisation may be better referred to as an orthographic task.

There are several possible reasons why performance in the current study's morphological awareness task did not correlate with ability to spell morphologically complex target words in the spelling production task. In the morphological awareness tasks, participants may have been able to identify that one sentence was different from the others on the basis of an implicit, rather than more explicit, level of morphological knowledge. This difficulty in distinguishing whether participants are using explicit or implicit awareness is known to be problematic in many morphological awareness tasks (Gombert, 1992). This is perhaps why an improvement was seen between pre- and post-test regardless of intervention group. Once they were familiar with the requirements of the task, participants may have been able to select the correct answer based on implicit rather than explicit morphological awareness.

This was the first study in which the oddity task was used as the sole measure of a child's morphological awareness of apostrophes. In previous studies with children, it has been used in conjunction with word and sentence analogy tasks (Nunes et al., 2006). Hokanson and Kemp (2012) used the task successfully as a sole measure of morphological awareness for adults. These authors had 10 items in their task, and the "odd-one-out" was varied between possessive and a plural. In contrast, the current study used only four items per condition, and the "odd-one-out" was consistent, either a possessive or lowercase (depending on condition). This was designed to reduce difficulty and fatigue for participants. However it may also have reduced variability between participants' performance. It is suggested that using a

greater number of trials would allow for greater variability between the participants and a stronger link between morphological awareness and ability may be revealed.

Only one previous study has included more than one intervention session, and the success rates were higher, but it is unclear how much this difference can be attributed to the longer intervention, versus the fact that the participants were adults rather than children (Hokanson & Kemp, 2012). Due to the difficult nature of apostrophes, accurate acquisition requires large amounts of practice. While it was not possible for the current study due to time constraints set by the participating schools, future research should endeavour to include more sessions. This would allow greater consolidation of learning and perhaps more beneficial outcomes.

Another important future direction is to investigate whether these improvements are maintained over an educationally relevant time-frame. Bryant et al. (1997) completed their post-test only one day following the intervention. The current study had a longer break of one week. Future research could endeavour to have follow-ups at three to six months, durable knowledge, not just temporary improvement in learning, is the key goal in education (Dunlosky, Rawson, Marsh, Nathan, & Willingham, 2013).

Bryant et al. (1997) proposed, spellers' lack of mastery of apostrophes may reflect a lack of awareness of the possessive apostrophe as a case of grammar. We propose that this proposition is even more acute in the case of plural possessives. As our study demonstrates, even at the age of 8 years, children have the ability to begin to understand plural possessives, and yet they are commonly omitted even in adulthood. This has important educational implications, as it suggests that if children are explicitly made aware of the presence of both singular and plural possessives,

these word forms may be more commonly used. Although complete mastery is unlikely due to their difficulty, exposure can improve outcomes.

Most recent studies on children's use of capitalisation have focused on the ability to begin a sentence with a capital. In contrast, the capital letter tasks used here focused on the morphological distinction between proper nouns (which require a capital) and common nouns (which do not), and future studies should continue to investigate this under-researched area.

In conclusion, it is evident that children continue to have difficulties with apostrophes and capitals even after explicit teaching, and (in the case of apostrophes) even into adulthood. Future research should focus on the best practices to help improve the use, understanding, and assessment of these silent morphemes in the primary school years.

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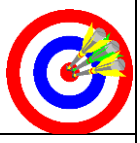
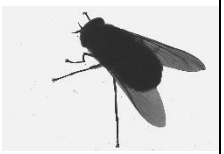
Appendix A: Participant Answer Sheet and Script for the Experimental Tasks (Version 1 and 2). [2]

Spelling Production Task (Version 1)

1. We went to _____ to get bread and milk. 	6. She spat out the _____ pip 
2. They had roast _____ for dinner. 	7. In her garden she planted pumpkin _____. 
3. Those _____ honey is in the honeycomb. 	8. Those two _____ blankets are pretty. 
4. The children sat on the _____. 	9. At the park, all of the _____ umbrellas blew away in the wind. 
5. The hungry boy ate up his _____. 	10. At tennis we take our own _____. 

[2] Please note: Format has been adjusted.

11. Her pet _____ tails are long and pink. 	18. In this game you have to hit the _____. 
12. After lunch they had full _____. 	19. My uncle just got back from _____. 
13. My _____ ball is flat. 	20. Mary showed us the two _____ patterns. 
14. I made a friend called _____. 	21. My _____ buttons fell off. 
15. The teacher asked _____ a question. 	22. Their tree had grown a lot of juicy _____. 
16. The _____ lid was broken. 	23. The _____ body was quite small. 
17. My favourite flower is a _____. 	

Morphological Awareness Task for Capital Letters (Version 1).

Example:

a) Mum needs to go to Margate.

b) Mum needs to go to the doctors.

c) Mum needs to go to Myer.

1	My favourite drink is…	A
		B
		C
2	We are going on a holiday …	A
		B
		C
3	Tomorrow I will go to ...	A
		B
		C
4	My Dad just came home from...	A
		B
		C

Morphological Awareness Task for Apostrophes (Version 1)

Example:

a) The bike's seat is comfy.
b) The spoons need washing.
c) The curtains are all closed.

1	The _____ were dark blue.	A
	The _____ cry was loud.	B
	The _____looked soft.	C
2	The _____ were very quiet.	A
	The _____ are swimming.	B
	The _____ leaves are green.	C
3	The _____ shirts are clean.	A
	The _____ look tidy.	B
	The _____ are folded.	C
4	The _____ seem bright.	a
	The _____ leg is fixed.	b
	The _____ are all packed.	c

Script for Experimental Task (Version 1)

For the first task there are twenty-three sentences in front of you and each sentence is missing a word. I will read you the full sentence, and then repeat the missing word for you, try your best to spell the word in the blank space. For example, I would read 'The boy saw some elephants at the zoo, Elephants.' You would need to write elephants.

Task:

1. We went to Coles to get bread and milk
2. They had roast turkey for dinner.
3. Those bees' honey is in the honeycomb.
4. The children sat on the mat.
5. The hungry boy ate up his peas.
6. Her pet rats' tails are long and pink.
7. She spat out the cherry's pip.
8. In her garden she planted pumpkin seeds.
9. Those two beds' blankets are pretty.
10. At the park, all of the ladies' umbrellas blew away in the wind.
11. At tennis we take our own rackets.
12. In this game you have to hit the target.
13. After lunch they had full bellies.
14. My brother's ball is flat
15. I made a friend called Daisy.
16. The teacher asked Mark a question.
17. The box's lid was broken.
18. My favourite flower is a lily.
19. My uncle just got back from China.
20. Mary showed us the two dishes' patterns.
21. My coat's buttons fell off.
22. Their tree had grown a lot of juicy peaches.
23. The fly's body was quite small.

For this second activity, I will read you three sentences, and I want you to pick which one is the odd-one-out. On your piece of paper circle a, b or c, for which one you think is different. Here is hint: it's about capitals. On your page you will see an example: a) Mum needs to go to Margate. b) Mum needs to go to the doctor's. c) Mum needs to go to Myer. The odd one out would be Mum needs to go to the doctor's, because Margate and Myer would need a capital, but doctor's doesn't. So you would need to circle b. I will read each set of sentences twice.

Task:

a) My favourite drink is Milo.
b) My favourite drink is juice.
c) My favourite drink is Pepsi.

a) We are going on a holiday in August.
b) We are going on a holiday overseas.
c) We are going on a holiday to Bali.

a) Tomorrow I will go to Melbourne.
b) Tomorrow I will go to Jenny's.
c) Tomorrow I will go to school.

a) My dad just came home from hospital.
b) My dad just came home from Sydney.
c) My dad just came home from Woolworths.

We are going to do the same activity again, trying to choose which sentence is the odd-one-out, but this time the sentences are about apostrophes. Even though there is a blank space, you don't need to write anything, just circle a b or c. On your page you will see an example: a) The bike's seat is comfy. b) The spoons need washing. c) The curtains are all closed. In this case, a) The bike's seat is comfy would be the odd one out. This is because the word *bike's* needs an apostrophe, but the other two words don't. So in this activity circle the sentence that needs an apostrophe. I will read each group of sentences twice.

Task:

a) The pencils were dark blue
b) The baby's cry was loud
c) The cushions looked soft

a) The insects were very quiet
b) The dolphins are swimming
c) The tree's leaves are green

a) The boy's shirts are clean
b) The shelves look tidy
c) The clothes are folded

a) The lights seem bright
b) The chair's leg is fixed.
c) The bags are all packed

Spelling Production Task (Version 2)

1. She made a necklace using some pink _____. 	7. That _____ fur was soft. 
2. The boy stole the _____ gadgets. 	8. The girl used the _____ wand. 
3. We went on a plane to _____. 	9. She made a _____ chain. 
4. The two _____ heads hang down when they sleep. 	10. At our school we do not like _____. 
5. After the fire, there were only _____ left. 	11. Those four _____ handles are quite long. 
6. Some _____ leaves fall off in autumn. 	12. She went shopping for new shoes at _____. 

13. We used the _____ plates for dinner.

19. I've got a friend called _____.

14. Anne thinks that lots of _____ leaves are spiky.

20. Our class is going to clean up some _____.

15. The poor dog was covered in _____.

21. When it is cold we wear our _____.

16. The shoe left a _____ on the floor.

22. My _____ tooth fell out

17. _____ and her mother went dancing.

23. The mums were worried because all the _____ prams were missing.

18. The _____ engine stopped.

Morphological Awareness Task for Capitals (Version 2)
Example:

a) I play cricket in summer.

b) I play cricket on Mondays.

c) I play cricket in January.

1	My sister likes going to...	A
		B
		C
2	We are going swimming at…	A
		B
		C
3	My Nan bought me a new…	A
		B
		C
4	My birthday is …	A
		B
		C

Morphological Awareness Task for Apostrophes (Version 2)

Example:

a) The book's page is ripped.

b) The boys play outside.

c) The planes fly high.

1	The ____ like sleeping.	A
	The ____ were on the couch.	B
	The ____ ears are small.	C
2	The ____ are rather dirty.	A
	The ____ beak is yellow.	B
	The ____ bounced high.	C
3	The ____ are in the paddock.	A
	The ____ tail is long.	B
	The ____ were singing loudly.	C
4	The ____ gloves are new	A
	The ____ feel a bit sick.	B
	The ____ look quite full.	C

Script for Experimental Tasks (Version 2)

For the first task there are twenty-three sentences in front of you and each sentence is missing a word. I will read you the full sentence, and then repeat the missing word for you, try your best to spell the word in the blank space. For example, I would read 'The boy bought some lollies from the shop, Lollies.' You would need to write lollies.

Task:

1. She made a necklace using some pink beads.
2. The boy stole the spy's gadgets.
3. We went on a plane to Turkey.
4. The two bats' heads hang down when they sleep.
5. After the fire, there were only coals left.
6. Some trees' leaves fall off in autumn.
7. That fox's fur was soft.
8. The girl used the fairy's wand.
9. She made a daisy chain.
10. At our school we do not like bullies.
11. Those four bags' handles are quite long.
12. She went shopping for new shoes at Target.
13. We used the china plates for dinner.
14. Anne thinks that lots of bushes' leaves are spiky.
15. The poor dog was covered in fleas.
16. The shoe left a mark on the floor.
17. Lily and her mother went dancing.
18. The boat's engine stopped.
19. I've got a friend called Matt.
20. Our class is going to clean up some beaches.
21. When it is cold we wear our jackets.
22. My sister's tooth fell out.
23. The mums were worried because all the babies' prams were missing

In this second activity, I will read you three sentences, and I want you to pick which one is the odd-one-out. On your piece of paper circle a, b or c, for which one you think is different. Here is hint: it's about capitals. On your page you will see an example: a) I play cricket in summer, b) I play cricket on Mondays. C) I play cricket in January. The odd one out would be I play cricket in summer, because January and Mondays would need a capital, but summer doesn't. So you would need to circle a. I will read each set of sentences twice.

Task:

a) My sister likes going to netball.
b) My sister likes going to McDonalds.
c) My sister likes going to Hobart

a) We are going swimming at Kingston.
b) We are going swimming at home.
c) We are going swimming at Sarah's.

a) My Nan bought me a new Barbie.
b) My Nan bought me a new Playstation.
c) My Nan bought me a new bike.

a) My birthday is in winter.
b) My birthday is in May.
c) My birthday is on Saturday.

We are going to do the same activity again, trying to choose which sentence is the odd-one-out, but this time the sentences are about apostrophes. Even though there is a blank space, you don't need to write anything, just circle a, b, or c. On your page you will see an example: a) the book's page is ripped. b) The boys play outside. c) The planes fly high. In this case a, the book's page is ripped would be the odd one out. This is because the word book's needs an apostrophe, but the other two words don't. So in this activity you need to circle the one with the apostrophe. I will read each set of sentences twice.

Task:

a) The ponies like sleeping.
b) The kittens were on the couch.
c) The monkey's ears are small.

a) The plates are rather dirty.
b) The bird's beak is yellow.
c) The balls bounced high.

a) The cows are in the paddock.
b) The cat's tail is long.
c) The birds were singing loudly.

a) The girl's gloves are new.
b) The bears feel a bit sick.
c) The bottles look quite full.

Appendix B: Human Research Ethics Committee Approval Letters.

Social Science Ethics Officer
Private Bag 01 Hobart
Tasmania 7001 Australia
Tel: (03) 6226 2763
Fax: (03) 6226 7148
Katherine.Shaw@utas.edu.au

HUMAN RESEARCH ETHICS COMMITTEE (TASMANIA) NETWORK

29 April 2015

Dr Nenagh Kemp
Psychology
Private Bag 30

Dear Dr Kemp

Re: FULL ETHICS APPLICATION APPROVAL
Ethics Ref: H0014826 - Helping children to learn to spell with apostrophes and capitals

We are pleased to advise that the Tasmania Social Sciences Human Research Ethics Committee approved the above project on 29 April 2015.

This approval constitutes ethical clearance by the Tasmania Social Sciences Human Research Ethics Committee. The decision and authority to commence the associated research may be dependent on factors beyond the remit of the ethics review process. For example, your research may need ethics clearance from other organisations or review by your research governance coordinator or Head of Department. It is your responsibility to find out if the approval of other bodies or authorities is required. It is recommended that the proposed research should not commence until you have satisfied these requirements.

Please note that this approval is for four years and is conditional upon receipt of an annual Progress Report. Ethics approval for this project will lapse if a Progress Report is not submitted.

The following conditions apply to this approval. Failure to abide by these conditions may result in suspension or discontinuation of approval.

1. It is the responsibility of the Chief Investigator to ensure that all investigators are aware of the terms of approval, to ensure the project is conducted as approved by the Ethics Committee, and to notify the Committee if any investigators are added to, or cease involvement with, the project.

2. Complaints: If any complaints are received or ethical issues arise during the course of the project, investigators should advise the Executive Officer of the Ethics Committee on 03 6226 7479 or human.ethics@utas.edu.au.

3. Incidents or adverse effects: Investigators should notify the Ethics Committee immediately of any serious or unexpected adverse effects on participants or unforeseen events affecting the ethical acceptability of the project.

4. Amendments to Project: Modifications to the project must not proceed until approval is obtained from the Ethics Committee. Please submit an Amendment Form (available on our website) to notify the Ethics Committee of the proposed modifications.

5. Annual Report: Continued approval for this project is dependent on the submission of a Progress Report by the anniversary date of your approval. You will be sent a courtesy reminder closer to this date. **Failure to submit a Progress Report will mean that ethics approval for this project will lapse.**

6. Final Report: A Final Report and a copy of any published material arising from the project, either in full or abstract, must be provided at the end of the project.

Yours sincerely

Natasha Jones
Ethics Officer
Tasmania Social Sciences HREC

Social Science Ethics Officer
Private Bag 01 Hobart
Tasmania 7001 Australia
Tel: (03) 6226 1832
Fax: (03) 6226 7148
Human.ethics@utas.edu.au

HUMAN RESEARCH ETHICS COMMITTEE (TASMANIA) NETWORK

01 July 2015

Dr Nenagh Kemp
Psychology
Private Bag 30

Sent via email

Dear Dr Kemp

Re: APPROVAL FOR AMENDMENT TO CURRENT PROJECT
Ethics Ref: H0014826 - Helping children to learn to spell with apostrophes and capitals
Amendment: To include an additional group of participants as outlined in the application for amendment dated 29/6/2015

We are pleased to advise that the Chair of the Tasmania Social Sciences Human Research Ethics Committee approved the Amendment to the above project on 30/6/2015

Yours sincerely

Natasha Jones
Ethics Officer
Tasmanian Social Sciences HREC

Appendix C: Department of Education's Educational Performance Research Committee Approval Letter.

Department of Education
EDUCATIONAL PERFORMANCE SERVICES

2/73 Murray Street, Hobart
GPO Box 169, Hobart, TAS 7001 Australia

Tasmania

File: 2015 - 21
5 June 2015
Miss Jessica Evans
Honours Student
University of Tasmania
Private Bag 30
Hobart TAS 7001

Dear Jessica

Children's Spelling of Apostrophes and Capital Letters

I have been advised by the Educational Performance Research Committee that the above research study adheres to the guidelines established and that there is no objection to the study proceeding.

Please note that you have been given permission to proceed at a general level, and not at individual school level. You will still need to seek permission from the principal of the school to be involved in the study. Please provide them with the File number or a copy of this letter when approaching them for assistance.

A copy of your final report should be forwarded to Educational Performance Services, Department of Education, GPO Box 169, Hobart, 7001 at your earliest convenience and within six months of the completion of the research phase.
If you have further questions or concerns please contact Paul Becker on (03) 6165 5705.
Yours sincerely

Katrina Beams, Assistant Director
(Educational Performance Services)

Appendix D: Participant Information and Consent Forms

Information and Consent Sheet for School Students

Children's spelling study

You are invited to help with our research on children's spelling.

If you decide to help with this research, you will work with the researcher, Jessica Evans, three times, at your school. She will ask you to write down some words and do some written activities. You will also need to write down your name and age. Only the researchers will get to see your answers, and we won't show them to anyone else. When you've finished, we'll keep your answers in a safe place where no one else can look at them. When we've finished writing about our study, your answers will be safely deleted. We'll send a letter to your school at the end of the year to tell you what we found.

We will be pleased if you would like to be in our study. But if you don't want to do it, or if you start and then want to stop, you can just say so. You don't need to tell us why.

Thank you for your help!

Nenagh Kemp Jessica Evans

Do you understand what I've just told you about the study, and do you understand what you have to do? If you do, and you don't have any more questions, are you happy to be in our study? If you are, please write your name below. We will keep your name separate from your answers.

Your name: _____ Date: _____

Statement by Investigator

☐ Via the enclosed Information Sheet and Consent Form, I have explained the project and the implications of participation to the child and I believe that the consent is informed and that he/she understands the implications of participation.

Investigator's name: _____

Investigator's signature: _____ Date: _____

Information Sheet for Parents of School Student Participants

Children's spelling of apostrophes and capital letters

Invitation

Your child is invited to participate in a research study on children's spelling of apostrophes and capital letters. This study is being conducted by Jessica Evans as part of the Honours program in Psychology at the University of Tasmania, and is being supervised by Dr Nenagh Kemp.

What is the purpose of this study?

Many words in English are difficult to spell, and apostrophes and capital letters are particularly hard to learn, because they aren't pronounced, so we can't hear when they should be used. The aim of this study is to see whether children's spelling of apostrophes or capitals can be improved in a single session when children are helped to think about the concepts behind these aspects of spelling. Of course, these aspects of spelling are already taught in schools, but we are interested in whether extra teaching can help further.

Why has my child been invited to participate?

The school is sending this invitation, on the researchers' behalf, to parents of all children in Grades 3 to 6. Any child can take part.

What will my child be asked to do?

If you and your child agree that your child can participate, your child will participate in three group sessions of about 30 minutes each, with Honours student Jessica Evans, at the school.

- In the first session, children will be asked to complete some written tasks. These will assess children's knowledge of apostrophes and capital letters by asking them to spell words containing these forms (e.g., *girl's, China*, vs. *girls, china*), and to pick the odd-one-out of spoken sentences that contain words with and without apostrophes or capitals.
- In the second session, Jessica will use game-like activities to help children to understand the concepts behind the use of apostrophes and capitals. About half the children will learn about apostrophes, and half will learn about capitals.
- In the third session, children will be re-assessed on their knowledge of apostrophes and capitals, with similar tasks to the first session, to see how much they have improved.

Children will be asked to provide their name for research identification purposes only, so that we can identify them during the three sessions. After the final session, children's names will be replaced with codes, and we won't keep their names on file.

Are there any possible benefits from participation in this study?
Children who participate will learn new skills in helping to decide when and how to use apostrophes or capital letters. More generally, this study will provide useful evidence about how children approach the use of apostrophes and capital letters, and whether even a short training session is effective in improving their ability.

Are there any possible risks from participation in this study?
There are no specific risks associated with taking part in this study.

What if my child changes his or her mind during or after the study?
If your child decides not to continue with the study once it's started, he or she can stop at any time, without needing to provide an explanation. If you or your child wished to withdraw after the final session, however, the individual data will no longer be identifiable, and so we won't be able to delete it.

What will happen to the information when this study is over?
Data will be stored in locked filing cabinets and on a password-protected computer in the University's Division of Psychology. Data will be kept for at least five years after publication, and then deleted.

How will the results of the study be published?
We will send a summary of the results of this study to the Principal to let parents know what we found. The findings of this study will also be written up in a thesis as a part of Jessica Evans' Honours degree, and eventually in a scientific journal article. Your child and school will not be identifiable in the publication of the results.

What if I have questions about this study?
Please do not hesitate to contact Dr. Nenagh Kemp via email at nenagh.kemp@utas.edu.au or by phone on 6226 7534 or Jessica Evans via email at evansjd@utas.edu.au if you would like to discuss any aspect of this study.

This study has been approved by the Tasmanian Social Sciences Human Research Ethics Committee. If you have concerns or complaints about the conduct of this study, please contact the Executive Officer of the HREC (Tasmania) Network on (03) 6226 7479 or email human.ethics@utas.edu.au. The Executive Officer is the person nominated to receive complaints from research participants. Please quote ethics reference number H0014826

You can keep this Information sheet. If you consent for your child to participate, please sign and return the attached statement of Informed Consent to the school.

Dr. Nenagh Kemp
Chief Investigator

Miss Jessica Evans
Student Investigator

Consent Form for Parents of School Student Participants

Children's spelling of apostrophes and capital letters

1. I agree for my child to take part in the research study named above, if he/she agrees.
2. I have read and understood the Information Sheet for this study.
3. The nature and possible effects of the study have been explained to me.
4. I understand that the study involves my child taking part in three half-hour sessions; the first and third to assess their use of apostrophes and capital letters, and the middle session to help improve their skills in choosing when to use apostrophes or capitals.
5. I understand that participation does not involve any foreseeable risks.
6. I understand that all research data will be securely stored on the University of Tasmania premises for five years from the publication of the study results, and will then be deleted.
7. Any questions that I have asked have been answered to my satisfaction.
8. I understand that the researchers will maintain confidentiality and that any information my child supplies to the researchers will be used only for the purposes of the research.
9. I understand that the results of the study will be published so that my child cannot be identified as a participant.
10. I understand that my child's participation is voluntary and that I may withdraw any data that her or she has provided, until the end of the third session, without consequence.

Child's name:

_____

Parent's name:

_____

Parent's signature: _____Date: _____

Statement by Investigator

Via the enclosed Information Sheet and Consent Form, I have explained the project and the implications of participation in it to this parent and I believe that the consent is informed and that he/she understands the implications of participation.

Investigator's name: _____

Investigator's signature: _____Date: _____

Information Sheet for School Principal/Head of Primary School

Children's spelling of apostrophes and capital letters

Invitation

Your school is invited to participate in a study on children's spelling of apostrophes and capital letters. This study is being conducted by Jessica Evans as part of the Honours program in Psychology at the University of Tasmania, and is being supervised by Dr Nenagh Kemp.

What is the purpose of this study?

Many words in English are difficult to spell, and apostrophes and capital letters are particularly hard to learn, because they aren't pronounced, so children can't hear when they should be used. The aim of this study is to see whether children's spelling of apostrophes or capitals can be improved in a single session when children are helped to think about the concepts behind these aspects of spelling. Of course, these aspects of spelling are already taught in schools, but we are interested in whether extra teaching can help further.

Why has my school been invited to participate?

We would like to invite children in Grade 3-6 at your school to participate to help us learn more about how we can help children to learn to use apostrophes and capitals consistently.

What will children be asked to do?

If your school decides to take part, we will first obtain permission from parents and children to participate. Participating children will take part in three group sessions of about 30 minutes each, with Honours student Jessica Evans, at the school.

- In the first session, children will be asked to complete some written tasks. These will assess children's knowledge of apostrophes and capital letters by asking them to spell words containing these forms (e.g., *girl's, China*, vs. *girls, china*), and to pick the odd-one-out of spoken sentences that contain words with and without apostrophes or capitals.
- In the second session, Jessica will use game-like activities to help children to understand the concepts behind the use of apostrophes and capitals. About half the children will learn about apostrophes, and half will learn about capitals.
- In the third session, children will be re-assessed on their knowledge of apostrophes and capitals, with similar tasks to the first session, to see how much they have improved.

Children will be asked to provide their name for research identification purposes only, so that we can identify them during the three sessions. After the final session, children's names will be replaced with codes, and we won't keep their names on file.

What would the school's participation involve?

Participation would involve distributing information and consent letters to all students in Grades 3 to 6 to take home to their parents or guardians. We can also provide a brief description of the study to place in the school newsletter/message board. We would like students to be able to take part in the study in an appropriate room in the school, at times arranged with school staff at their convenience.

Are there any possible benefits from participation in this study?
Children who participate will learn new skills in helping to decide when and how to use apostrophes or capital letters. More generally, this study will provide useful evidence about how children approach the use of apostrophes and capital letters, and whether even a short training session is effective in improving their ability.

Are there any possible risks from participation in this study?
There are no specific risks associated with taking part in this study.

What if a child changes his or her mind during or after the study?
If a child decides not to continue with the study once it's started, he or she can stop at any time, without needing to provide an explanation. If a child wished to withdraw after the final session, however, the individual data will no longer be identifiable, and so we won't be able to delete it.

What will happen to the information when this study is over?
Data will be stored in locked filing cabinets and on a password-protected computer in the University's Division of Psychology. Data will be kept for at least five years after publication, and then deleted.

How will the results of the study be published?
We will send the school a summary of the results of this study to let you know what we find. This can also be passed on to teachers and parents. We are also happy to come into the school to talk about the results. The findings will be written up in a thesis as a part of Jessica Evans' Honours degree, and we will also aim to publish the results in an academic journal article. No participant, or their school, will be identifiable from the results.

What if I have questions about this study?
Please do not hesitate to contact Dr. Nenagh Kemp via email at nenagh.kemp@utas.edu.au or by phone on 6226 7534 or Jessica Evans via email at evansjd@utas.edu.au if you would like to discuss any aspect of this study.

This study has been approved by the Tasmanian Social Sciences Human Research Ethics Committee. If you have concerns or complaints about the conduct of this study, please contact the Executive Officer of the HREC (Tasmania) Network on (03) 6226 7479 or email human.ethics@utas.edu.au. The Executive Officer is the person nominated to receive complaints from research participants. Please quote ethics reference number H0014826
You will receive a copy of this Information sheet, and of the statement of Informed Consent. One copy of the Consent form should be signed for the investigator, and

one will be given to you to keep for your own records. Thank you for considering this study.

Dr. Nenagh Kemp
Chief Investigator

Miss Jessica Evans
Student Investigator

Consent Form for School Principal / Head of Primary School

Children's spelling of apostrophes and capital letters

1. I agree for my school to be involved in the research study named above.
2. I have read and understood the Information Sheet for this study.
3. The nature and possible effects of the study have been explained to me.
4. I understand that the study involves Grade 3-6 students taking part in three half-hour sessions; the first and third to assess their use of apostrophes and capital letters, and the middle session to help improve their skills in choosing when to use apostrophes or capitals.
5. I understand that participation does not involve any foreseeable risks.
6. I understand that all research data will be securely stored on the University of Tasmania premises for five years from the publication of the study results, and will then be destroyed.
7. Any questions that I have asked have been answered to my satisfaction.
8. I understand that the researchers will maintain confidentiality and that any information participants supply to the researchers will be used only for the purposes of the research.
9. I understand that the results of the study will be published so that participants cannot be identified as a participant.
10. I understand that my child's participation is voluntary and that I may withdraw any data that her or she has provided, until the end of the third session, without consequence.

School name:

_____

Principal's name: _____Principal's signature:_____

Date: _____

Statement by Investigator

Via the enclosed Information Sheet and Consent Form, I have explained the project and the implications of participation in it to this principal and I believe that the consent is informed and that he/she understands the implications of participation.

Investigator's name: _____

Investigator's signature: _____Date: _____

Appendix E: Script for Intervention Sessions

Words in black represent those read by the researcher. Words in red are the expected responses from children.

Apostrophe Intervention
Who can tell me what this first picture is? 

Yes that's right, it is called an apostrophe. Does anyone know when you should use it?
So like you said we use it when you _____,

(Contraction): So that is right, we use it instead of a letter in some words to shorten them. Does anyone know when else we use apostrophes?
(Possession): Yes, today we are going to talk about the times that you use it when you own, or even when a group all own something. They can also be used to shorten some words like cannot into can't. But we won't be talking about those today, we will only talk about those which are used to show possession. We will also talk about when you don't have to use an apostrophe.
So like last week, this is going to start off easy. So does anyone know what this is called? (Frog). What do you say when you have more than one frog? (Frogs).


What about this one? (mug), and what do you say when you have more than one mug? (Mugs)

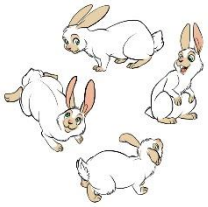

So that is really easy to say, but can you have a go at writing frog and frogs down. Now have a go at writing mug and mugs down.
So when we have more than one thing does anyone know what it is called when you have more than one thing?
(Plural) That's right, and when we have a plural, how do we write that down?
(We add s) Yes, we normally add '*s*' to the end of a word to show it is a plural. But in some words we don't add an *s*. So for example, if you have more than one child, do you have childs? No, you have (children).When you have more than one mouse

you have (mice), and more than one goose you have (geese). But there aren't many words like that. Most of the time you just add *s*.



Do we need an apostrophe when we write a plural? No! We never need to use an apostrophe when we are just adding *s* to say that there is more than one of something. Sometimes, for words that end in *y*, like *bunny*, instead of just adding an s, we do more than just add an s, does anyone know what we do? That's right we (change the y to an *i* and add *es*). Do you think that this plural would need an apostrophe? (No). That's right, it still doesn't need an apostrophe. So *bunnies* would be written like this:

Bunnies



So what do you call more than one pony? (Ponies). Can you all have a go at writing ponies?

What would you call more than one country? (Countries). Can you write down countries for me?

What about if you wanted to talk about more than one brush? Does anyone know how we would spell that? Yes, so to talk about more than one brush, we add an e and s rather than just s. We do this for a lot of words that end in x, s, ch and sh. But do you think when we put es at the end of a word that we need to add an apostrophe? (No).

What is it called when have more than one witch? (Witches). Have a go at writing witches for me.

What about when mum has to do her tax, she has to do a lot of _____. (Taxes). Have a go at spelling that.

What if there is more than one bus? (Buses). Can you spell buses?

Good job everyone, so at the start of today we talked about times when you do need to use an apostrophe. Does anyone remember when that was?
(Contractive): Yes we do need to use it when we want to say words like don't. But we also use it when we want to say something belongs to someone or something.
(Possessive): Yes that's right, we need to use it when we are saying that someone or something owns something.
So for example, the man has a house, it is the man's house. Now you try: The flower has petals. It's the _____ (flower's petals).

Does anyone know how we would write man's down? Where would be put the apostrophe?
So because the man owns the house, we need to add an apostrophe before the s. It's the same with the flower, because the petals belong to the flower. We always need to put an apostrophe when we want to show that one thing owns the other. We put the apostrophe after the owner.
So what about this one? The car has wheels. It's the _____ (car's wheels). Can you have a go at writing down the car's wheels?

The turtle has a shell, it's the _____ (turtle's shell). Can you write the turtle's shell for me?

The school has a playground, it's the _____ (school's playground). Have a go at writing the school's playground.

Remember when we were writing the plural of bunny, which was bunnies, and we needed to change the ending to *ies*? Does anyone know if we still have to change the *y* to an *ies* when we use an apostrophe? (No). That's right, we don't need to do that when we are using an apostrophe, we can just leave it as a *y*, and add an apostrophe and an *s*. Like this:

The bunny's carrot.

So how would we write the pony's tail? Have a go at writing it down for me.

What about the country's flag, have a go at that one.

It's the same with those words which end in *x, s* and *ch*. We don't need to add *es* anymore, when we want to say that something owns something, we just need to add an apostrophe and an s. So if the witch has a broom, it's the _____. (Witch's broom).

Have a go at writing this one, the bus has a driver, it's the _____, (bus's driver).
Have a go at writing the bus's driver.

The mailbox has letters. They are the mailbox's letters. Can you write that down for me?

Now this is where it gets really tricky, sometimes more than one thing can own something. For example all the frogs have lily pads. Does anyone know how you say this? That is pretty easy to say, but can anyone have a guess how you would write it? (No correct answer) It's very tricky so I will tell you. Because it is a plural, like we had the start, we need to put an s on the end. Like we did with frogs. But because they own something we also need to have an apostrophe. Have a go at how you think you would put both an s and an apostrophe at the end of a word.
So it looks like this, at the end of the word you put an *s*, AND THEN you put an apostrophe.

The frogs' lily pads.

So let's have a go at that. Can you write the pigs' tails?

What about the cars' windows? Can you write that for me?

So on the next page are the answers, do you see how when there is more than one of something that owns something we add an *s* and then we add an apostrophe, that's different than when there is only one isn't it? When something is owned by only one person or object we put an apostrophe and then the s!

Just to make it even trickier, does anyone remember what we had to do for words that end in *ch, sh, s* and *x* to make them a plural? How did we have to spell buses? Does anyone want to have a go at what they think we would write when we are talking about the buses' windows? So the windows of more than one bus.

So you can see the answer on the next page, when we are saying that more than one bus owns something, we still need to make it a plural, so we add an *es* on the end. AND THEN put an apostrophe on the end to show that it OWNS something. See how it is a plural AND has an apostrophe.
Now you have a go, have a try at writing the witches' hats.

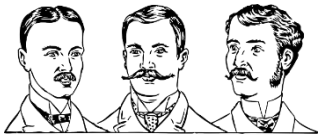
What about for words like bunny? How did we spell the plural? We changed the *y* to an *i* and added *es*! So if we wanted to say the bunnies' noses how would you spell that? That's right, we would spell it like the plural with an *ies*, and then add at apostrophe at the end.

The bunnies' noses.

So now you have a go, try writing the ponies' tails.

Remember when we were talking about words like child that change when we turn them into plurals? When we have more than one child we have children. How do you think you would write the children's socks? That's right, you write children, because that is the plural, and then you add an apostrophe AND THEN what do you need add at the end to make it say children's? (An *s*). That's right an *s*.

The easiest way to remember all these tricky ones where a group own something is that you change it into a plural first and put the apostrophe next. Like we did at the start and then I added an apostrophe to also show that the group are owning something. You have a go at the next one. So there is more than one man so there are _____ (men). Can you write the men's moustaches for me?



And on the very last page I just have an example of all three types so you can see the difference. So the top sentence is using frogs as a plural, the second one is when one frog owns something, and who remembers what the third sentence is showing? That's right! When a group of frogs all own something.

The frogs were hungry.
The frog's tongue was long.
The frogs' lily pads were green.

Capital Intervention

To start off today can I please get everyone to write their names at the top of their sheet? Your first and your last name.
Does anyone know what suburb your school is in? That's right, it is in _____. Can you write _____ down for me?
How about the street? Does anyone know what street your school is on? It is on _____ road. Can you write down _____ for me.
What country do we all live in? (Australia). Can everyone write Australia down please.
And what day of the week is it today? (Wednesday) Can you write that on your piece of paper for me?

So does anyone know what these words need at the start that other words like cat and house don't need? (A capital letter). That's right they need a capital letter at the start. So if the big letters are capital then what do you call the other letters? (Lowercase). So can everyone write the first letter of their name as a capital and now can you write it as a lowercase. Now can you write the letter G as a capital and now can you write it as a lowercase.

So does anybody know when we need to use capital letters?
(At the start of a sentence). That's right, we need to use them when we start a sentence, and when else do you use capitals?
(In the word *I*) That's right whenever we use the word *I* it is a capital, no matter where in the sentence it is. What other words need a capital no matter where they are in the sentence?
(For names of places and people). Yes, that right, we need them for names of things like people, countries, cities and also days of the week and months of the year. Does anyone know what the name for these kinds of words are? (Proper nouns). That's right, they are called proper nouns. So nouns name people, places or things, and there

are two types of nouns – common nouns and proper nouns. Proper nouns are used to name a one-of-kind thing. They have a capital letter no matter where in the sentence they are.
So for example, if I wanted to write the sentence "I would like a chocolate bar, chocolate would not need a capital letter, because it is a common noun. Common nouns are for general terms like chocolate, which could mean any of type of chocolate.

I would like a chocolate bar.

But, if I wanted to write the sentence "I would like a Mars bar." I would need a capital, because it is the name of a particular chocolate bar. So it is a proper noun.

I would like a Mars bar.

So now I want you to have a go at this one. This is Homer Simpson, can you write down his name. Good work. Now what if I say: This is a man, can you write down man?

Now can you have a go at this one: This dog's name is Sam, can you write down Sam? Well done. Now try this dog is a pug – can you write down pug?

Good work everyone. So did you notice that Homer Simpson and Sam were both names, and so like we talked about before, names need capital letters. Whereas words like pug and man, are more general terms that aren't talking about one particular person or animal.

So now we are going to try some about places. This country is India. Can you write down India? This country is tropical, can you write down tropical?

Does anyone know what continent this might be? That's right, this continent is Antarctica. Can you write down Antarctica? Now try this one: This continent is cold. Can you write down cold?

So when we write down place, like countries and continents, we need to use capital letters. We use capital letters for other place names too, like streets and cities. Words like cold and tropical, don't need capital letters because they are not naming a particular thing.

So another time we need to use capital letters is when we are talking about days of the weeks or months of the year. We also use capital letters when we are talking about special holidays, like Easter.

So tomorrow is (Thursday), can you write Thursday? Good job.
It gets really cold in winter, can you write winter?
So days of the week, like Thursday need a capital. Days of the weeks, as well as months of the year need capitals. However, the seasons don't need capitals.
Now I want you to have a go at this one.
I rode my bike yesterday. Can you write yesterday? I am looking forward to Christmas, can you write Christmas?

Christmas is in December, can you write December?
In a fortnight, I am going on an aeroplane. Can you write down fortnight?
So which of those words do you think needed a capital letter? That's right, both December and Christmas need capitals, because again they are particular month or day. Yesterday is a more general term which can be used on any day. Fortnight is the same, it also does not need a capital because it can used to talk about any point in time.

Appendix F: Additional Results

Table F1

Correlations between Scores on the WRAT Spelling, the Apostrophe Morphological Awareness Task, and Spelling of Apostrophe Items at both Pre- and Post- Test, by Intervention Group.

			WRAT spelling	Pre MA task	Post MA Task
Apostrophe	Pre	Plural	.256	.220	.373
		Singular Possessive	.062	-.441*	-.421*
		Plural Possessive	-	-	-
	Post	Plural	.339	.213	.516**
		Singular Possessive	.548**	.373	-.093
		Plural Possessive	.499**	.346	.378
Capital	Pre	Plural	.410*	.197	.144
		Singular Possessive	.406*	.560*	-.092
		Plural Possessive	-	-	-
	Post	Plural	.373	.254	.143
		Singular Possessive	.434*	.538**	.318
		Plural Possessive	-	-	-

**Correlation is significant at the .01 level *Correlation is significant at a .05 level

Table F2.

Correlations between scores on the WRAT Spelling, Capitalisation Morphological Awareness Task, and the Correct Use of Capitalisation by Intervention Group.

			WRAT spelling	Pre MA Task	Post MA task
Apostrophe	Pre	Capital	.505**	.301	.200
		Lowercase	-.113	-.400*	-.307
	Post	Capital	.654**	.340	.471*
		Lowercase	.324	-.043	.343
Capital	Pre	Capital	.525**	.349	.222
		Lowercase	.077	.391*	.479**
	Post	Capital	.182	.248	.139
		Lowercase	.158	.073	.215

**Correlation is significant at the .01 level *Correlation is significant at a .05 level

Table F3:

Correlations between WRAT Spelling, Morphological Awareness Tasks, and Spelling Production Task Results for Adults.

	WRAT Spelling	MA Apos Task	MA Cap Task
Plural	-.026	-.104	-
Singular Possessive	.277	-.090	-
Plural Possessive	.561**	.093	-
Capital	.006	-	.123
Lowercase	.23	-	.182

Table F4:

Correlations between WRAT Spelling, Morphological Awareness Tasks and Spelling Production Task Results for Children in Grades Five and Six.

	WRAT Spelling	MA Apos Task	MA Cap Task
Plural	-.002	.566**	-
Singular Possessive	.476*	.047	-
Plural Possessive	.216	.171	-
Capital	.608**	-	.383
Lowercase	-.142	-	.115

Appendix G: SPSS Output.

1. Grade 3 and 4 Frequencies

Grade

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	3	23	41.8	41.8	41.8
	4	32	58.2	58.2	100.0
	Total	55	100.0	100.0	

Language

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	EnglOK	50	90.9	90.9	90.9
	2	5	9.1	9.1	100.0
	Total	55	100.0	100.0	

2. Mean WRAT and Age

Descriptive Statistics

	N	Minimum	Maximum	Mean		Std. Deviation
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic
WRATstd	55	84	145	108.07	1.750	12.977
AgeMths	55	104	125	114.76	.848	6.286
Valid N (listwise)	55					

3. Effect of Language

Tests of Between-Subjects Effects

Dependent Variable: WRATstd

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	4.729[a]	1	4.729	.028	.869	.001
Intercept	214001.456	1	214001.456	1247.893	.000	.959
Language	4.729	1	4.729	.028	.869	.001
Error	9088.980	53	171.490			
Total	651478.000	55				
Corrected Total	9093.709	54				

a. R Squared = .001 (Adjusted R Squared = -.018)

Descriptive Statistics

Dependent Variable: WRATstd

Language	Mean	Std. Deviation	N
EnglOK	107.98	13.165	50
2	109.00	12.207	5
Total	108.07	12.977	55

4. Spelling Ability Between Groups

Dependent Variable: WRATstd

Intervention	Mean	Std. Deviation	N
1	103.15	9.534	27
2	112.82	14.200	28
Total	108.07	12.977	55

Tests of Between-Subjects Effects

Dependent Variable: WRATstd

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	1286.195[a]	1	1286.195	8.731	.005	.141
Intercept	641127.285	1	641127.285	4352.185	.000	.988
Intervention	1286.195	1	1286.195	8.731	.005	.141
Error	7807.515	53	147.312			
Total	651478.000	55				
Corrected Total	9093.709	54				

a. R Squared = .141 (Adjusted R Squared = .125)

5. Group Means at Pre- and Post-Test

Descriptive Statistics

Intervention		N	Minimum	Maximum	Mean		Std. Deviation
		Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic
1	PrePlural	27	.00	1.00	.5778	.06695	.34789
	PreSingPoss	27	.00	1.00	.4593	.06736	.35001
	PrePluPoss	27	.00	.00	.0000	.00000	.00000
	PreCap	27	.00	1.00	.6389	.05867	.30487
	PreNoCap	27	.25	1.00	.7778	.04873	.25318
	PostPlural	27	.00	1.00	.5778	.06346	.32972
	PostSingPoss	27	.00	1.00	.5926	.06177	.32097
	PostPluPoss	27	.00	.80	.1926	.04948	.25709
	PostCap	27	.00	1.00	.6111	.05556	.28868
	PostNoCap	27	.25	1.00	.8241	.04777	.24821
	Valid N (listwise)	27					
2	PrePlural	28	.40	1.00	.8143	.02897	.15327
	PreSingPoss	28	.00	1.00	.3071	.06625	.35059
	PrePluPoss	28	.00	.00	.0000	.00000	.00000
	PreCap	28	.25	1.00	.6786	.05434	.28753
	PreNoCap	28	.25	1.00	.7946	.03649	.19309
	PostPlural	28	.60	1.00	.8857	.02804	.14836
	PostSingPoss	28	.00	1.00	.3429	.06890	.36457
	PostPluPoss	28	.00	.00	.0000	.00000	.00000
	PostCap	28	.25	1.00	.7054	.05613	.29700
	PostNoCap	28	.25	1.00	.7946	.03649	.19309
	Valid N (listwise)	28					

6. Group Means of the Difference Scores

Descriptive Statistics

Intervention		N	Minimum	Maximum	Mean	Std. Deviation
1	PluralDiff	27	-.60	.60	.0000	.30382
	SingPossDiff	27	-.60	1.00	.1333	.38028
	PlurPossDiff	27	.00	.80	.1926	.25709
	CapDiff	27	-.75	1.00	-.0278	.37553
	NoCapDiff	27	-.50	.50	.0463	.25036
	Valid N (listwise)	27				
2	PluralDiff	28	-.20	.60	.0714	.19024
	SingPossDiff	28	-.80	.80	.0357	.32228
	PlurPossDiff	28	.00	.00	.0000	.00000
	CapDiff	28	-.50	.50	.0268	.28333
	NoCapDiff	28	-.75	.75	.0000	.27217
	Valid N (listwise)	28				

7. ANOVA for Apostrophe Intervention

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b] Greenhouse-Geisser
WordType	.806	11.194	2	.004	.838

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square
WordType	Sphericity Assumed	.113	2	.057
	Greenhouse-Geisser	.113	1.675	.068
	Huynh-Feldt	.113	1.757	.065
	Lower-bound	.113	1.000	.113
WordType * Intervention	Sphericity Assumed	.492	2	.246
	Greenhouse-Geisser	.492	1.675	.293
	Huynh-Feldt	.492	1.757	.280
	Lower-bound	.492	1.000	.492
Error(WordType)	Sphericity Assumed	7.483	106	.071
	Greenhouse-Geisser	7.483	88.801	.084
	Huynh-Feldt	7.483	93.095	.080
	Lower-bound	7.483	53.000	.141

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		F	Sig.	Partial Eta Squared
WordType	Sphericity Assumed	.804	.450	.015
	Greenhouse-Geisser	.804	.431	.015
	Huynh-Feldt	.804	.436	.015
	Lower-bound	.804	.374	.015
WordType * Intervention	Sphericity Assumed	3.482	.034	.062
	Greenhouse-Geisser	3.482	.043	.062
	Huynh-Feldt	3.482	.041	.062
	Lower-bound	3.482	.068	.062
Error(WordType)	Sphericity Assumed			
	Greenhouse-Geisser			
	Huynh-Feldt			
	Lower-bound			

Tests of Between-Subjects Effects

Measure: MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	.859	1	.859	10.904	.002	.171
Intervention	.219	1	.219	2.783	.101	.050
Error	4.177	53	.079			

8. Planned Contrasts

Plural Difference:

Between-Subjects Factors

		N
Intervention	1	27
	2	28

Descriptive Statistics

Dependent Variable: PluralDiff

Intervention	Mean	Std. Deviation	N
1	.0000	.30382	27
2	.0714	.19024	28
Total	.0364	.25266	55

Tests of Between-Subjects Effects

Dependent Variable: PluralDiff

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	.070[a]	1	.070	1.101	.299	.020
Intercept	.070	1	.070	1.101	.299	.020
Intervention	.070	1	.070	1.101	.299	.020
Error	3.377	53	.064			
Total	3.520	55				
Corrected Total	3.447	54				

a. R Squared = .020 (Adjusted R Squared = .002)

Singular Possessive Difference:

Between-Subjects Factors

		N
Intervention	1	27
	2	28

Descriptive Statistics

Dependent Variable: SingPossDiff

Intervention	Mean	Std. Deviation	N
1	.1333	.38028	27
2	.0357	.32228	28
Total	.0836	.35212	55

Tests of Between-Subjects Effects

Dependent Variable: SingPossDiff

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	.131[a]	1	.131	1.058	.308	.020
Intercept	.393	1	.393	3.172	.081	.056
Intervention	.131	1	.131	1.058	.308	.020
Error	6.564	53	.124			
Total	7.080	55				
Corrected Total	6.695	54				

a. R Squared = .020 (Adjusted R Squared = .001)

Plural Possessive Difference:

Between-Subjects Factors

		N
Intervention	1	27
	2	28

Descriptive Statistics

Dependent Variable: PlurPossDiff

Intervention	Mean	Std. Deviation	N
1	.1926	.25709	27
2	.0000	.00000	28
Total	.0945	.20314	55

Tests of Between-Subjects Effects

Dependent Variable: PlurPossDiff

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	.510[a]	1	.510	15.724	.000	.229
Intercept	.510	1	.510	15.724	.000	.229
Intervention	.510	1	.510	15.724	.000	.229
Error	1.719	53	.032			
Total	2.720	55				
Corrected Total	2.228	54				

a. R Squared = .229 (Adjusted R Squared = .214)

9. Planned Contrast for Differences between Groups:

Between Plural Difference and Singular Possessive Difference:

Descriptive Statistics

Intervention		Mean	Std. Deviation	N
1	PluralDiff	.0000	.30382	27
	SingPossDiff	.1333	.38028	27
2	PluralDiff	.0714	.19024	28
	SingPossDiff	.0357	.32228	28

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Intervention	Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.
1	Wordtype	1.000	.000	0	.
2	Wordtype	1.000	.000	0	.

Tests of Within-Subjects Effects

Measure: MEASURE_1

Intervention	Source		F	Sig.	Partial Eta Squared
1	Wordtype	Sphericity Assumed	1.835	.187	.066
		Greenhouse-Geisser	1.835	.187	.066
		Huynh-Feldt	1.835	.187	.066
		Lower-bound	1.835	.187	.066
	Error(Wordtype)	Sphericity Assumed			
		Greenhouse-Geisser			
		Huynh-Feldt			
		Lower-bound			
2	Wordtype	Sphericity Assumed	.256	.617	.009
		Greenhouse-Geisser	.256	.617	.009
		Huynh-Feldt	.256	.617	.009
		Lower-bound	.256	.617	.009
	Error(Wordtype)	Sphericity Assumed			
		Greenhouse-Geisser			
		Huynh-Feldt			
		Lower-bound			

Tests of Within-Subjects Effects

Measure: MEASURE_1

Intervention	Source		Type III Sum of Squares	df	Mean Square
1	Wordtype	Sphericity Assumed	.240	1	.240
		Greenhouse-Geisser	.240	1.000	.240
		Huynh-Feldt	.240	1.000	.240
		Lower-bound	.240	1.000	.240
	Error(Wordtype)	Sphericity Assumed	3.400	26	.131
		Greenhouse-Geisser	3.400	26.000	.131
		Huynh-Feldt	3.400	26.000	.131
		Lower-bound	3.400	26.000	.131
2	Wordtype	Sphericity Assumed	.018	1	.018
		Greenhouse-Geisser	.018	1.000	.018
		Huynh-Feldt	.018	1.000	.018
		Lower-bound	.018	1.000	.018
	Error(Wordtype)	Sphericity Assumed	1.882	27	.070
		Greenhouse-Geisser	1.882	27.000	.070
		Huynh-Feldt	1.882	27.000	.070
		Lower-bound	1.882	27.000	.070

Between Singular Possessive and Plural Possessive:

Descriptive Statistics

Intervention		Mean	Std. Deviation	N
1	SingPossDiff	.1333	.38028	27
	PlurPossDiff	.1926	.25709	27
2	SingPossDiff	.0357	.32228	28
	PlurPossDiff	.0000	.00000	28

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Intervention	Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.
1	Wordtype	1.000	.000	0	.
2	Wordtype	1.000	.000	0	.

Mauchly's Test of Sphericity[a]

Tests of Within-Subjects Effects

Measure: MEASURE_1

Intervention	Source		F	Sig.	Partial Eta Squared
1	Wordtype	Sphericity Assumed	.595	.448	.022
		Greenhouse-Geisser	.595	.448	.022
		Huynh-Feldt	.595	.448	.022
		Lower-bound	.595	.448	.022
	Error(Wordtype)	Sphericity Assumed			
		Greenhouse-Geisser			
		Huynh-Feldt			
		Lower-bound			
2	Wordtype	Sphericity Assumed	.344	.562	.013
		Greenhouse-Geisser	.344	.562	.013
		Huynh-Feldt	.344	.562	.013
		Lower-bound	.344	.562	.013
	Error(Wordtype)	Sphericity Assumed			
		Greenhouse-Geisser			
		Huynh-Feldt			
		Lower-bound			

Tests of Within-Subjects Effects

Measure: MEASURE_1

Intervention	Source		Type III Sum of Squares	df	Mean Square
1	Wordtype	Sphericity Assumed	.047	1	.047
		Greenhouse-Geisser	.047	1.000	.047
		Huynh-Feldt	.047	1.000	.047
		Lower-bound	.047	1.000	.047
	Error(Wordtype)	Sphericity Assumed	2.073	26	.080
		Greenhouse-Geisser	2.073	26.000	.080
		Huynh-Feldt	2.073	26.000	.080
		Lower-bound	2.073	26.000	.080
2	Wordtype	Sphericity Assumed	.018	1	.018
		Greenhouse-Geisser	.018	1.000	.018
		Huynh-Feldt	.018	1.000	.018
		Lower-bound	.018	1.000	.018
	Error(Wordtype)	Sphericity Assumed	1.402	27	.052
		Greenhouse-Geisser	1.402	27.000	.052
		Huynh-Feldt	1.402	27.000	.052
		Lower-bound	1.402	27.000	.052

9. ANOVA for the Capital Intervention:

Descriptive Statistics

	Intervention	Mean	Std. Deviation	N
CapDiff	1	-.0278	.37553	27
	2	.0268	.28333	28
	Total	.0000	.32984	55
NoCapDiff	1	.0463	.25036	27
	2	.0000	.27217	28
	Total	.0227	.26031	55

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b] Greenhouse-Geisser
WordType	1.000	.000	0	.	1.000

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square
WordType	Sphericity Assumed	.015	1	.015
	Greenhouse-Geisser	.015	1.000	.015
	Huynh-Feldt	.015	1.000	.015
	Lower-bound	.015	1.000	.015
WordType * Intervention	Sphericity Assumed	.070	1	.070
	Greenhouse-Geisser	.070	1.000	.070
	Huynh-Feldt	.070	1.000	.070
	Lower-bound	.070	1.000	.070
Error(WordType)	Sphericity Assumed	4.385	53	.083
	Greenhouse-Geisser	4.385	53.000	.083
	Huynh-Feldt	4.385	53.000	.083
	Lower-bound	4.385	53.000	.083

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		F	Sig.	Partial Eta Squared
WordType	Sphericity Assumed	.186	.668	.003
	Greenhouse-Geisser	.186	.668	.003
	Huynh-Feldt	.186	.668	.003
	Lower-bound	.186	.668	.003
WordType * Intervention	Sphericity Assumed	.845	.362	.016
	Greenhouse-Geisser	.845	.362	.016
	Huynh-Feldt	.845	.362	.016
	Lower-bound	.845	.362	.016
Error(WordType)	Sphericity Assumed			
	Greenhouse-Geisser			
	Huynh-Feldt			
	Lower-bound			

Tests of Between-Subjects Effects

Measure: MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	.014	1	.014	.147	.703	.003
Intervention	.000	1	.000	.005	.944	.000
Error	5.079	53	.096			

10. Error Analysis

Descriptive Statistics

Intervention		N	Minimum	Maximum	Mean		Std. Deviation
		Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic
1	PreAposOmitPlural	27	.00	.00	.0000	.00000	.00000
	PreIntruSPPlural	27	.00	5.00	1.4444	.33047	1.71718
	PreIntruPPPlural	27	.00	.00	.0000	.00000	.00000
	PreUnconvAposPlura	27	.00	2.00	.2593	.10117	.52569
	PreUnconvNoAposPlural	27	.00	2.00	.4074	.12241	.63605
	PreEndingOmitPlural	27	.00	1.00	.0370	.03704	.19245
	PreNotAvailPlural	27	.00	.00	.0000	.00000	.00000
	PreCorrectPlural	27	.00	5.00	2.8519	.34469	1.79108
	PreAposOmitSP	27	.00	5.00	1.9259	.34971	1.81714
	PreIntruSPSP	27	.00	.00	.0000	.00000	.00000
	PreIntrusPPSP	27	.00	.00	.0000	.00000	.00000
	PreUnconvAposSP	27	.00	3.00	.3333	.14122	.73380
	PreUnconvNoAposSP	27	.00	2.00	.3704	.10871	.56488
	PreEndingOmitSP	27	.00	1.00	.0370	.03704	.19245
	PreNotAvailSP	27	.00	1.00	.0370	.03704	.19245
	PreCorrectSP	27	.00	5.00	2.2963	.33680	1.75005
	PreAposOmitPP	27	.00	5.00	2.6296	.29307	1.52286
	PreIntrusSPPP	27	.00	5.00	1.7407	.30472	1.58339
	PreIntrusPPPP	27	.00	.00	.0000	.00000	.00000
	PreUnconvAposPP	27	.00	1.00	.1111	.06163	.32026
	PreUnconvNoAposPP	27	.00	3.00	.4815	.16339	.84900
	PreEndingOmitPP	27	.00	1.00	.0370	.03704	.19245
	PreNotAvailPP	27	.00	.00	.0000	.00000	.00000
	PreCorrectPP	27	.00	.00	.0000	.00000	.00000
	PostAposOmitPlural	27	.00	.00	.0000	.00000	.00000
	PostAposIntrusSpPlural	27	.00	4.00	1.2963	.27119	1.40917
	PostIntrusPpPlural	27	.00	1.00	.1111	.06163	.32026
	PostUnconvAposPlural	27	.00	2.00	.1852	.09302	.48334
	PostUnconvNoAposPlural	27	.00	2.00	.2593	.11439	.59437
	PostEndingOmitPlural	27	.00	2.00	.1481	.08777	.45605
	PostNotAvailPlural	27	.00	.00	.0000	.00000	.00000
	PostCorrectPlural	27	.00	5.00	3.0000	.31123	1.61722
	PostAposOmitSp	27	.00	5.00	1.5185	.29896	1.55342
	PostIntrusSpSp	27	.00	.00	.0000	.00000	.00000
	PostIntruPpSp	27	.00	1.00	.0370	.03704	.19245
	PostUnconvAposSp	27	.00	2.00	.1852	.09302	.48334
	PostUnconvNoAposSP	27	.00	1.00	.1111	.06163	.32026
	PostEndingOmitSp	27	.00	2.00	.2222	.09745	.50637
	PostNotAvailSp	27	.00	.00	.0000	.00000	.00000
	PostCorrectSp	27	.00	5.00	2.9259	.33302	1.73041
	PostAposOmitPP	27	.00	5.00	1.9630	.25865	1.34397
	PostIntruSpPP	27	.00	5.00	1.6667	.26149	1.35873
	PostIntrusPpPP	27	.00	.00	.0000	.00000	.00000
	PostUnconvAposPP	27	.00	3.00	.2963	.13934	.72403
	PostUnconvNoAposPP	27	.00	2.00	.2593	.10117	.52569
	PostEndingOmitPP	27	.00	2.00	.0741	.07407	.38490
	PostNotAvailPP	27	.00	.00	.0000	.00000	.00000
	PostCorrectPP	27	.00	4.00	.7407	.21742	1.12976
	Valid N (listwise)	27					

2	PreAposOmitPlural	28	.00	.00	.0000	.00000	.00000
	PreIntruSPPlural	28	.00	1.00	.1071	.05952	.31497
	PreIntruPPPlural	28	.00	.00	.0000	.00000	.00000
	PreUnconvAposPlura	28	.00	1.00	.0357	.03571	.18898
	PreUnconvNoAposPlural	28	.00	2.00	.7857	.12968	.68622
	PreEndingOmitPlural	28	.00	1.00	.0357	.03571	.18898
	PreNotAvailPlural	28	.00	.00	.0000	.00000	.00000
	PreCorrectPlural	28	2.00	5.00	4.0357	.14069	.74447
	PreAposOmitSP	28	.00	5.00	2.8571	.34394	1.81994
	PreIntruSPSP	28	.00	.00	.0000	.00000	.00000
	PreIntrusPPSP	28	.00	.00	.0000	.00000	.00000
	PreUnconvAposSP	28	.00	1.00	.0714	.04956	.26227
	PreUnconvNoAposSP	28	.00	2.00	.4286	.13041	.69007
	PreEndingOmitSP	28	.00	2.00	.2143	.10736	.56811
	PreNotAvailSP	28	.00	.00	.0000	.00000	.00000
	PreCorrectSP	28	.00	5.00	1.4286	.34284	1.81411
	PreAposOmitPP	28	.00	5.00	3.7857	.25384	1.34322
	PreIntrusSPPP	28	.00	5.00	.6429	.21340	1.12922
	PreIntrusPPPP	28	.00	.00	.0000	.00000	.00000
	PreUnconvAposPP	28	.00	.00	.0000	.00000	.00000
	PreUnconvNoAposPP	28	.00	2.00	.5000	.14996	.79349
	PreEndingOmitPP	28	.00	1.00	.0714	.04956	.26227
	PreNotAvailPP	28	.00	.00	.0000	.00000	.00000
	PreCorrectPP	28	.00	.00	.0000	.00000	.00000
	PostAposOmitPlural	28	.00	.00	.0000	.00000	.00000
	PostAposIntrusSpPlural	28	.00	1.00	.0357	.03571	.18898
	PostIntrusPpPlural	28	.00	.00	.0000	.00000	.00000
	PostUnconvAposPlural	28	.00	.00	.0000	.00000	.00000
	PostUnconvNoAposPlural	28	.00	2.00	.5357	.14069	.74447
	PostEndingOmitPlural	28	.00	.00	.0000	.00000	.00000
	PostNotAvailPlural	28	.00	.00	.0000	.00000	.00000
	PostCorrectPlural	28	3.00	5.00	4.4286	.14019	.74180
	PostAposOmitSp	28	.00	5.00	2.7143	.33277	1.76083
	PostIntrusSpSp	28	.00	.00	.0000	.00000	.00000
	PostIntruPpSp	28	.00	.00	.0000	.00000	.00000
	PostUnconvAposSp	28	.00	1.00	.0714	.04956	.26227
	PostUnconvNoAposSP	28	.00	3.00	.3214	.12655	.66964
	PostEndingOmitSp	28	.00	1.00	.1429	.06734	.35635
	PostNotAvailSp	28	.00	1.00	.0357	.03571	.18898
	PostCorrectSp	28	.00	5.00	1.7143	.34448	1.82284
	PostAposOmitPP	28	.00	5.00	3.5714	.30615	1.61998
	PostIntruSpPP	28	.00	5.00	1.0357	.29314	1.55116
	PostIntrusPpPP	28	.00	.00	.0000	.00000	.00000
	PostUnconvAposPP	28	.00	2.00	.1071	.07867	.41627
	PostUnconvNoAposPP	28	.00	1.00	.2500	.08333	.44096
	PostEndingOmitPP	28	.00	1.00	.0357	.03571	.18898
	PostNotAvailPP	28	.00	.00	.0000	.00000	.00000
	PostCorrectPP	28	.00	.00	.0000	.00000	.00000
	Valid N (listwise)	28					

11. Means for the Morphological Awareness Task

Descriptive Statistics

Intervention		N	Minimum	Maximum	Mean		Std. Deviation
		Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic
1	PreMACap	27	0	4	2.89	.195	1.013
	PreMAApos	27	0	4	2.48	.241	1.252
	PostMACap	27	.00	4.00	3.2222	.22222	1.15470
	PostMAApos	27	.00	4.00	2.8148	.25619	1.33119
	Valid N (listwise)	27					
2	PreMACap	28	1	4	2.68	.200	1.056
	PreMAApos	28	1	4	3.00	.185	.981
	PostMACap	28	.00	4.00	2.5000	.27458	1.45297
	PostMAApos	28	.00	4.00	3.2143	.22629	1.19744
	Valid N (listwise)	28					

12. Correlations for the Morphological Awareness Task

Correlations

		PrePlural	PreSingPoss	PrePluPoss	PostPlural	WRATstd	PostSingPoss	PostPluPoss	PreCap	PreNoCap	PostCap	PostNoCap	PreMAApos	PreMACap	PostMAApos	PostMACap
PrePlural	Pearson Correlation	1	-.341*	.b	.628**	.382**	-.273*	-.072	.204	-.128	.269*	.154	.278*	.110	.327*	-.095
	Sig. (2-tailed)		.011	.	.000	.004	.044	.599	.135	.352	.047	.262	.040	.424	.015	.490
	N	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55
PreSingPoss	Pearson Correlation	-.341*	1	.b	-.279*	.159	.520**	.127	.223	.207	.232	.085	.189	.110	-.287*	-.060
	Sig. (2-tailed)	.011		.	.039	.245	.000	.356	.102	.129	.088	.538	.167	.423	.034	.666
	N	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55
PrePluPoss	Pearson Correlation	.b	.b	.b	.b	.b	.b	.b	.b	.b	.b	.b	.b	.b	.b	.b
	Sig. (2-tailed)	.	.		.	.	.	.	.	.	.	.	.	.	.	.
	N	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55
PostPlural	Pearson Correlation	.628**	-.279*	.b	1	.434**	-.283*	-.105	.260	.037	.154	.132	.301*	.098	.408**	-.117
	Sig. (2-tailed)	.000	.039	.		.001	.036	.447	.055	.790	.262	.339	.026	.476	.002	.396
	N	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55
WRATstd	Pearson Correlation	.382**	.159	.b	.434**	1	.279*	.044	.492**	.005	.389**	.180	.407**	.259	.103	.067
	Sig. (2-tailed)	.004	.245	.	.001		.039	.751	.000	.968	.003	.189	.002	.057	.453	.627
	N	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55
PostSingPoss	Pearson Correlation	-.273*	.520**	.b	-.283*	.279*	1	.356**	.299*	.153	.282*	.228	.327*	.405**	.054	.291*
	Sig. (2-tailed)	.044	.000	.	.036	.039		.008	.026	.264	.037	.093	.015	.002	.697	.031
	N	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55
PostPluPoss	Pearson Correlation	-.072	.127	.b	-.105	.044	.356**	1	.255	-.282*	.178	-.148	.122	.419**	.166	.253
	Sig. (2-tailed)	.599	.356	.	.447	.751	.008		.060	.037	.195	.281	.376	.001	.227	.062
	N	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55
PreCap	Pearson Correlation	.204	.223	.b	.260	.492**	.299*	.255	1	.016	.371**	.031	.109	.315*	.104	.141
	Sig. (2-tailed)	.135	.102	.	.055	.000	.026	.060		.907	.005	.823	.428	.019	.451	.306
	N	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55
PreNoCap	Pearson Correlation	-.128	.207	.b	.037	.005	.153	-.282*	.016	1	.016	.309*	.165	-.045	.145	.187
	Sig. (2-tailed)	.352	.129	.	.790	.968	.264	.037	.907		.907	.022	.230	.742	.291	.172
	N	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55
PostCap	Pearson Correlation	.269*	.232	.b	.154	.389**	.282*	.178	.371**	.016	1	.120	.398**	.269*	.166	.222
	Sig. (2-tailed)	.047	.088	.	.262	.003	.037	.195	.005	.907		.382	.003	.047	.226	.103
	N	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55
PostNoCap	Pearson Correlation	.154	.085	.b	.132	.180	.228	-.148	.031	.309*	.120	1	.079	.017	.112	.278*
	Sig. (2-tailed)	.262	.538	.	.339	.189	.093	.281	.823	.022	.382		.565	.902	.416	.040
	N	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55
PreMAApos	Pearson Correlation	.278*	.189	.b	.301*	.407**	.327*	.122	.109	.165	.398**	.079	1	.314*	.233	.155
	Sig. (2-tailed)	.040	.167	.	.026	.002	.015	.376	.428	.230	.003	.565		.020	.087	.257
	N	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55
PreMACap	Pearson Correlation	.110	.110	.b	.098	.259	.405**	.419**	.315*	-.045	.269*	.017	.314*	1	.258	.269*
	Sig. (2-tailed)	.424	.423	.	.476	.057	.002	.001	.019	.742	.047	.902	.020		.057	.047
	N	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55
PostMAApos	Pearson Correlation	.327*	-.287*	.b	.408**	.103	.054	.166	.104	.145	.166	.112	.233	.258	1	.217
	Sig. (2-tailed)	.015	.034	.	.002	.453	.697	.227	.451	.291	.226	.416	.087	.057		.111
	N	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55
PostMACap	Pearson Correlation	-.095	-.060	.b	-.117	.067	.291*	.253	.141	.187	.222	.278*	.155	.269*	.217	1
	Sig. (2-tailed)	.490	.666	.	.396	.627	.031	.062	.306	.172	.103	.040	.257	.047	.111	
	N	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

b. Cannot be computed because at least one of the variables is constant.

13. Grade 5 and 6 Frequencies:

Grade

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	5	10	52.6	52.6	52.6
	6	9	47.4	47.4	100.0
	Total	19	100.0	100.0	

Language

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	EnglOK	17	89.5	89.5	89.5
	2	2	10.5	10.5	100.0
	Total	19	100.0	100.0	

14. Pre-Test Descriptive Statistics for both Age Groups:

Descriptive Statistics

		N	Minimum	Maximum	Mean		Std. Deviation
Gradesep		Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic
Young	PrePlural	65	.00	1.00	.6800	.03611	.29112
	PreSingPoss	65	.00	1.00	.3662	.04332	.34923
	PrePluPoss	65	.00	.00	.0000	.00000	.00000
	PreNoCap	65	.25	1.00	.7846	.02842	.22912
	PreCap	65	.00	1.00	.6423	.03757	.30288
	Valid N (listwise)	65					
Older	PrePlural	19	.00	1.00	.7895	.06574	.28654
	PreSingPoss	19	.00	1.00	.4526	.08765	.38205
	PrePluPoss	19	.00	.40	.0211	.02105	.09177
	PreNoCap	19	.00	1.00	.7105	.06695	.29182
	PreCap	19	.00	1.00	.7500	.06893	.30046
	Valid N (listwise)	19					

15. ANOVA of Differences between the groups

Apostrophe:

Descriptive Statistics

Dependent Variable: PreApMeanOverall

Gradesep	Mean	Std. Deviation	N
Young	.3426	.12011	65
Older	.4316	.17550	19
Total	.3627	.13859	84

Tests of Between-Subjects Effects

Dependent Variable: PreApMeanOverall

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	.116[a]	1	.116	6.464	.013	.073
Intercept	8.811	1	8.811	488.930	.000	.856
Gradesep	.116	1	.116	6.464	.013	.073
Error	1.478	82	.018			
Total	12.644	84				
Corrected Total	1.594	83				

a. R Squared = .073 (Adjusted R Squared = .062)

Capital:

Descriptive Statistics

Dependent Variable: PreCapMeanOverall

Gradesep	Mean	Std. Deviation	N
Young	.7423	.18339	65
Older	.7368	.20789	19
Total	.7411	.18791	84

Tests of Between-Subjects Effects

Dependent Variable: PreCapMeanOverall

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	.000[a]	1	.000	.012	.912	.000
Intercept	32.167	1	32.167	900.128	.000	.917
Gradesep	.000	1	.000	.012	.912	.000
Error	2.930	82	.036			
Total	49.063	84				
Corrected Total	2.931	83				

a. R Squared = .000 (Adjusted R Squared = -.012)

16. Descriptive Statistics for Pilot Intervention:

Descriptive Statistics

Intervention		N	Minimum	Maximum	Mean		Std. Deviation
		Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic
1	PrePlural	5	.40	1.00	.7600	.09798	.21909
	PreSingPoss	5	.00	.80	.2800	.13565	.30332
	PrePluPoss	5	.00	.00	.0000	.00000	.00000
	PreNoCap	5	.00	1.00	.4500	.16583	.37081
	PreCap	5	.50	1.00	.7000	.09354	.20917
	PostPlural	5	.60	1.00	.8800	.08000	.17889
	PostSingPoss	5	.00	.80	.3600	.13266	.29665
	PostPluPoss	5	.00	.00	.0000	.00000	.00000
	PostCap	5	.00	1.00	.7500	.19365	.43301
	PostNoCap	5	.25	1.00	.5500	.14577	.32596
	Valid N (listwise)	5					
2	PrePlural	3	.00	1.00	.6000	.30551	.52915
	PreSingPoss	3	.60	.80	.7333	.06667	.11547
	PrePluPoss	3	.00	.00	.0000	.00000	.00000
	PreNoCap	3	.50	.75	.5833	.08333	.14434
	PreCap	3	1.00	1.00	1.0000	.00000	.00000
	PostPlural	3	1.00	1.00	1.0000	.00000	.00000
	PostSingPoss	3	.40	1.00	.7333	.17638	.30551
	PostPluPoss	3	.00	.00	.0000	.00000	.00000
	PostCap	3	.75	1.00	.9167	.08333	.14434
	PostNoCap	3	.75	1.00	.9167	.08333	.14434
	Valid N (listwise)	3					

17. Correlations in the Morphological Awareness Task

Correlations

		WRATstd	PrePlural	PreSingPoss	PrePluPoss
WRATstd	Pearson Correlation	1	-.002	.476*	.216
	Sig. (2-tailed)		.995	.039	.375
	N	19	19	19	19
PrePlural	Pearson Correlation	-.002	1	-.035	.178
	Sig. (2-tailed)	.995		.886	.466
	N	19	19	19	19
PreSingPoss	Pearson Correlation	.476*	-.035	1	.347
	Sig. (2-tailed)	.039	.886		.146
	N	19	19	19	19
PrePluPoss	Pearson Correlation	.216	.178	.347	1
	Sig. (2-tailed)	.375	.466	.146	
	N	19	19	19	19
PreMAApos	Pearson Correlation	.344	.566*	.047	.171
	Sig. (2-tailed)	.150	.012	.849	.485
	N	19	19	19	19
PreMACap	Pearson Correlation	.173	.109	-.037	.231
	Sig. (2-tailed)	.479	.656	.881	.342
	N	19	19	19	19
PreCap	Pearson Correlation	.608**	.290	.436	.201
	Sig. (2-tailed)	.006	.228	.062	.408
	N	19	19	19	19
PreNoCap	Pearson Correlation	-.142	.227	.294	.240
	Sig. (2-tailed)	.562	.349	.222	.322
	N	19	19	19	19

18. Adult Frequency Data:

Sex

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	7	26.9	26.9	26.9
	Female	19	73.1	73.1	100.0
	Total	26	100.0	100.0	

Language

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	English	24	92.3	92.3	92.3
	Other	2	7.7	7.7	100.0
	Total	26	100.0	100.0	

19. Adult Descriptive Data

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
AgeMths	26	18	66	30.54	15.508
WRATstd	26	91	145	114.38	13.700
Valid N (listwise)	26				

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Plural	26	.80	1.00	.9769	.06516
SingPoss	26	.00	1.00	.7923	.35091
PluPoss	26	.00	1.00	.3231	.38813
NoCap	26	.25	1.00	.8942	.20215
Cap	26	.75	1.00	.9904	.04903
Valid N (listwise)	26				

20. Repeated Measures ANOVA

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b] Greenhouse-Geisser
WordType	.901	2.512	2	.285	.910

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Epsilon[b] Huynh-Feldt	Lower-bound
WordType	.977	.500

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F
WordType	Sphericity Assumed	5.909	2	2.954	38.894
	Greenhouse-Geisser	5.909	1.819	3.248	38.894
	Huynh-Feldt	5.909	1.954	3.024	38.894
	Lower-bound	5.909	1.000	5.909	38.894
Error(WordType)	Sphericity Assumed	3.798	50	.076	
	Greenhouse-Geisser	3.798	45.480	.084	
	Huynh-Feldt	3.798	48.854	.078	
	Lower-bound	3.798	25.000	.152	

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Sig.	Partial Eta Squared
WordType	Sphericity Assumed	.000	.609
	Greenhouse-Geisser	.000	.609
	Huynh-Feldt	.000	.609
	Lower-bound	.000	.609
Error(WordType)	Sphericity Assumed		
	Greenhouse-Geisser		
	Huynh-Feldt		
	Lower-bound		

21. Planned Contrasts

Plural and Singular Possessive:

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b] Greenhouse-Geisser
WordType	1.000	.000	0	.	1.000

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Epsilon[b] Huynh-Feldt	Lower-bound
WordType	1.000	1.000

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F
WordType	Sphericity Assumed	.443	1	.443	7.500
	Greenhouse-Geisser	.443	1.000	.443	7.500
	Huynh-Feldt	.443	1.000	.443	7.500
	Lower-bound	.443	1.000	.443	7.500
Error(WordType)	Sphericity Assumed	1.477	25	.059	
	Greenhouse-Geisser	1.477	25.000	.059	
	Huynh-Feldt	1.477	25.000	.059	
	Lower-bound	1.477	25.000	.059	

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Sig.	Partial Eta Squared
WordType	Sphericity Assumed	.011	.231
	Greenhouse-Geisser	.011	.231
	Huynh-Feldt	.011	.231
	Lower-bound	.011	.231
Error(WordType)	Sphericity Assumed		
	Greenhouse-Geisser		
	Huynh-Feldt		
	Lower-bound		

Singular Possessive and Plural Possessive:

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b] Greenhouse-Geisser
WordType	1.000	.000	0	.	1.000

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Epsilon[b] Huynh-Feldt	Lower-bound
WordType	1.000	1.000

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F
WordType	Sphericity Assumed	2.862	1	2.862	28.881
	Greenhouse-Geisser	2.862	1.000	2.862	28.881
	Huynh-Feldt	2.862	1.000	2.862	28.881
	Lower-bound	2.862	1.000	2.862	28.881
Error(WordType)	Sphericity Assumed	2.478	25	.099	
	Greenhouse-Geisser	2.478	25.000	.099	
	Huynh-Feldt	2.478	25.000	.099	
	Lower-bound	2.478	25.000	.099	

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Sig.	Partial Eta Squared
WordType	Sphericity Assumed	.000	.536
	Greenhouse-Geisser	.000	.536
	Huynh-Feldt	.000	.536
	Lower-bound	.000	.536
Error(WordType)	Sphericity Assumed		
	Greenhouse-Geisser		
	Huynh-Feldt		
	Lower-bound		

22. Repeated Measures for Capitals

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b] Greenhouse-Geisser
WordType	1.000	.000	0	.	1.000

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Epsilon[b] Huynh-Feldt	Lower-bound
WordType	1.000	1.000

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F
WordType	Sphericity Assumed	.120	1	.120	5.297
	Greenhouse-Geisser	.120	1.000	.120	5.297
	Huynh-Feldt	.120	1.000	.120	5.297
	Lower-bound	.120	1.000	.120	5.297
Error(WordType)	Sphericity Assumed	.567	25	.023	
	Greenhouse-Geisser	.567	25.000	.023	
	Huynh-Feldt	.567	25.000	.023	
	Lower-bound	.567	25.000	.023	

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Sig.	Partial Eta Squared
WordType	Sphericity Assumed	.030	.175
	Greenhouse-Geisser	.030	.175
	Huynh-Feldt	.030	.175
	Lower-bound	.030	.175
Error(WordType)	Sphericity Assumed		
	Greenhouse-Geisser		
	Huynh-Feldt		
	Lower-bound		

23. Adults compared to children

Descriptive Statistics

Dependent Variable: ApsMeanOverall

AdultY	Mean	Std. Deviation	N
1.00	.3631	.14984	56
3.00	.6907	.18942	25
Total	.4642	.22222	81

Tests of Between-Subjects Effects

Dependent Variable: ApsMeanOverall

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	1.855[a]	1	1.855	69.902	.000	.469
Intercept	19.192	1	19.192	723.377	.000	.902
AdultY	1.855	1	1.855	69.902	.000	.469
Error	2.096	79	.027			
Total	21.404	81				
Corrected Total	3.951	80				

a. R Squared = .469 (Adjusted R Squared = .463)

24. Descriptive Statistics for the Morphological Awareness Task

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
MAApos	26	3	4	3.92	.272
MACap	26	0	4	3.62	1.023
Valid N (listwise)	26				

25. Correlations for the Morphological Awareness Task

Correlations

		WRATstd	MAApos	MACap	Plural	SingPoss
WRATstd	Pearson Correlation	1	.051	.122	-.026	.277
	Sig. (2-tailed)		.804	.552	.902	.171
	N	26	26	26	26	26
MAApos	Pearson Correlation	.051	1	.321	-.104	-.090
	Sig. (2-tailed)	.804		.110	.612	.661
	N	26	26	26	26	26
MACap	Pearson Correlation	.122	.321	1	-.138	.081
	Sig. (2-tailed)	.552	.110		.500	.696
	N	26	26	26	26	26
Plural	Pearson Correlation	-.026	-.104	-.138	1	.202
	Sig. (2-tailed)	.902	.612	.500		.323
	N	26	26	26	26	26
SingPoss	Pearson Correlation	.277	-.090	.081	.202	1
	Sig. (2-tailed)	.171	.661	.696	.323	
	N	26	26	26	26	26
PluPoss	Pearson Correlation	.561**	.093	.305	.307	.277
	Sig. (2-tailed)	.003	.650	.129	.128	.170
	N	26	26	26	26	26
Cap	Pearson Correlation	.006	-.058	.123	-.072	-.004
	Sig. (2-tailed)	.978	.779	.550	.726	.983
	N	26	26	26	26	26
NoCap	Pearson Correlation	.228	.210	.182	.415*	.016
	Sig. (2-tailed)	.262	.303	.373	.035	.937
	N	26	26	26	26	26